

Snow going...6

Snow flowing...10

Snow dozing...16

High Country

news

Friday, January 8, 1982

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75¢



Mike McInerney

Atlantic City, Wyoming

If I were a bear,
And a big bear, too,
I shouldn't much care,
If it froze or snow.

— A.A. Milne,
Now We Are Six

SURVIVING WINTER

IN THE ROCKIES

WESTERN ROUNDUP

Elkhorns to be "wildlife unit"

The U.S. Forest Service has officially proposed a prototype alternative to wilderness for the mineral-rich Elkhorn Mountains near Helena, Montana, the first such proposal in Forest Service history.

Termed a "wildlife management unit," the administrative designation would mandate the 85,760-acre area be managed with wildlife as the dominant resource.

The idea is being greeted with caution by conservationists, some of whom think the designation could be an "end run" around wilderness. Arnold Bolle, treasurer of the Wilderness Society, said the idea of a wildlife management unit "is a questionable one."

The final EIS on the Elkhorns, which contained U.S. Secretary of Agriculture John Block's recommendation that the area not be designated wilderness, also contained seven major points upon which the Forest Service should construct its management plan for the area.

"Wildlife habitat," said the major point of the report, "will be managed to maintain viable populations of species associated with existing ecosystems, with emphasis on selected species that have seclusion as one of their habitats."

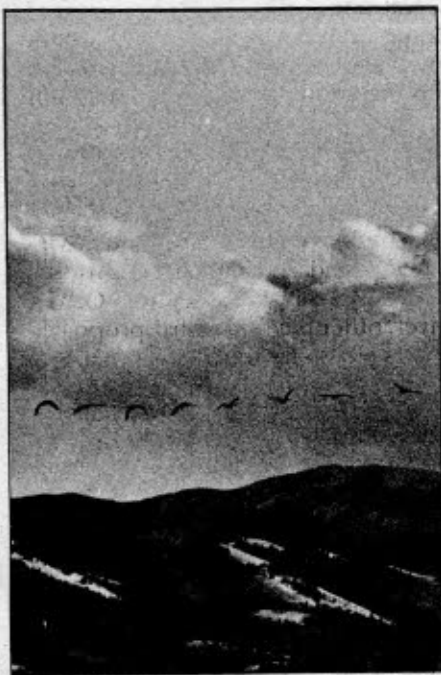
The selected species refer to moose, mountain goats and to a lesser extent elk, which are numerous in the Elkhorns.

Several other points specify that vehicular access, logging and mineral extraction are to be carried out in a way compatible with wildlife values.

"Essentially," Terry Seyden, a spokesman for the Helena National Forest in Helena said, "a wildlife management unit is an alternative to wilderness that will allow more multiple use than wilderness would."

Bolle said the key to feasibility of the proposal lies in whether the Forest Service establishes the wildlife unit administratively or legislatively.

"When we first discussed the idea with Rupert Cutler (assistant secretary of agriculture in the Carter administration) the plan was to be passed by Congress," Bolle said. "But now it looks as if it might be established administratively." Bolle said without the protection of law an administrative proposal can be changed by the next, or even the same administration. If that's the case,



The Elkhorns

Bolle said, a wildlife management unit "will take constant vigilance."

No one at this time, including the Forest Service, knows whether the plan will be approved administratively or not.

The Elkhorns have been a bone of contention in the Helena area for nearly ten years. A high use recreation area because of their proximity to Butte and Helena, wildlife and wilderness groups have favored maximum protection.

But the area is also rich in mineral deposits, which some observers believe is what led to the wildlife management unit designation in lieu of wilderness. According to the U.S. Geological Survey the area has extensive gold, silver, copper, molybdenum, lead, zinc, iron, and possibly uranium and thorium deposits. There are also sand, gravel and limestone deposits.

And, to add to the difficulty of formulating a management plan, the area has 19 patented mining claims either wholly or partially within its boundaries, which, according to the Mining Law of 1872, have guaranteed access.

Crow Creek Falls, a long, ribbon-like falls with a large pool at the base is called the "Jewel of the Elkhorns" by area citizens. It sits in the middle of a 20-acre patented claim and soon a mine will be sunk into the pool. Tunnels will be blasted through the rock in order to channel water away from the area.

Timber is less of an issue in the Elkhorns. "It's not really a new concept to the timber industry," Al Kington spokesman for Wickes Forest Products near Townsend said, "We have to log with minimal impact on wildlife all the time. This is just a bigger area."

— Jim Robbins

In-stream issue may make ballot

It is up to the Wyoming secretary of state to determine whether the Wyoming In-Stream Flow Committee will succeed in putting a referendum question on the ballot. No group has ever succeeded in placing a referendum on the ballot in the state's history.

"It is practically impossible to succeed with a referendum in this state unless you have a lot of money," said Lynn Dickey, director of the petition drive. The state constitution requires gathering signatures from 15 percent of the voters in the previous general election while most other states require only five percent. Procedural requirements are also unusually cumbersome. A petition's sponsor must witness all signatures on the petition and must swear to the witnessing before a notary.

The committee collected 29,668 signatures from people in the state who wanted the opportunity to vote on the in-stream flow question. If placed on the ballot and approved by the voters, it would give the state the right to file for unused water and to acquire existing water rights from willing sellers or donors. This water is not currently considered a beneficial use left in the streams for fish, wildlife and livestock, but would be considered so under such legislation. All other Rocky Mountain states except Utah presently have in-stream flow laws.

Secretary of State Thyra Thomson has until Feb. 8 to determine if enough of the 29,668 signatures are valid to qualify for a referendum. 27,154 are needed.

If Wyoming legislators are convinced the public supports in-stream flow legislation, they could pass their own bill in the 1982 session, eliminating the need for the voter initiative to place it on the 1982 general election ballot. Dickey said legislators have previously refused to fully discuss the issue.

Dickey said the significant effects would not be noticed for 20 to 30 years after such a measure was adopted. Presently the Wyoming Game and Fish Department has little if any money to buy water rights, and almost all water in the state is appropriated by other users.

Game and Fish can still apply for water rights and get a 1982 or 1983 date. This means that in future years if water is left after prior appropriations are fully satisfied, the state could obtain that left-over water.

This opportunity would be critical in the future, if, for example, a power plant



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Dear friends,

In hot pursuit of the story about avalanches appearing in this issue, managing editor Dan Whipple attended a four day seminar on the subject presented by the American Avalanche Institute in Jackson, Wyoming. AAI was founded by Rod Newcomb, who along with two other instructors, teaches the course.

Newcomb has been conducting the seminars for about seven years. He gave 17 separate courses last year and will do 12 this year. The courses are directed at professional snow safety patrollers at ski areas, backcountry skiers, outdoor group leaders and anyone else interested in avalanches. It is a very comprehensive program, clearly presented.

The course that Whipple attended was conducted for the National Outdoor Leadership School which is located here in Lander. The NOLS instructors who took the avalanche seminar were learning to teach winter courses for the school. Avalanches are an obvious part

of the safety program for a winter outdoor course.

Much of the avalanche seminar took place on Teton Pass. This was where Whipple's problems began. While he is an enthusiastic skier, no one has ever confused him with Jean-Claude Killy. The NOLS instructors were quite accomplished skiers and the course instructors — Newcomb, John Stratton and Robby Fuller — were all excellent.

Consequently, we regret to admit, Whipple did not carry the athletic banner of *HCN* as well as he might have. In fact, said he, "It was humiliating. The only analogy I can remember from my life is the day I mistakenly got into a pickup basketball game in Washington, D.C. with Adrian Dantley, who now plays for the Utah Jazz in the National Basketball Association. I couldn't cover Dantley and I couldn't keep up with these folks skiing.

"Everybody was quite nice about it,

though. Newcomb even allowed that the snow conditions were terrible, which was true, and that even he would have trouble in them, which was not." In any event, Whipple got down the hills without breaking anything except his spirit.

One truly remarkable demonstration at the seminar was the recovery of a simulated avalanche victim by a specially trained dog. NOLS instructor Herbie Ogden volunteered to be buried about four feet deep in the snow, trusting the dog to find him before he suffocated. Stratton, who owned the dog, took it about 150 yards up the hill, then worked it back down. Despite the presence of about 20 people and their individual scents, the dog — who was named Tenzing, by the way — found Herbie in about four or five minutes.

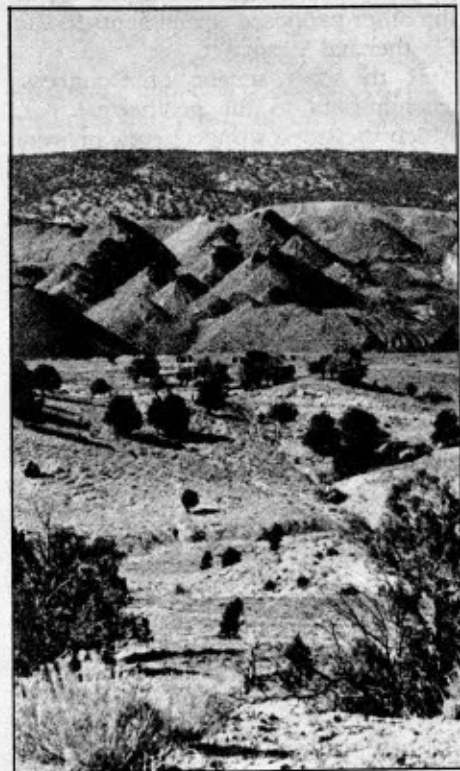
At any rate, Whipple says that he loved the course and found the whole subject fascinating. *HCN* would like to thank NOLS for allowing us to take up space and Newcomb and AAI for having us along.

— the staff

or a gasification plant shut down and was selling its water rights. Then the state could bid on the water.

The Wyoming Game and Fish Department will put a high priority on acquiring water rights in several streams important to the energy industry. The department has listed 10 Class I streams and 31 Class II streams, including several in the coal- and uranium-rich Powder River Basin and the Overthrust Belt, where many oil companies are now active. The classifications are based upon fishery potential.

— Marjane Ambler



Coal tailings piles outside Black Mesa mine, Navajo Reservation

Tribal coal jurisdiction slowed

More than four years after the Surface Mining Control and Reclamation Act was passed, the federal government still has not implemented the section of the act designed to give Indian tribes control over coal mining on their reservations. The delay has exacerbated jurisdiction disputes between the tribes and the states.

As part of the 1977 act, Congress called for a study of the Indian lands question and directed the Interior Department to submit appropriate legislation by January 1979. Interior Department officials don't expect legislation to be submitted until 1983 because of the change in administrations and promises by Interior Secretary James Watt not to open the SMCRA to amendments within the year.

However, the Office of Surface Mining is now drafting its own Indian lands regulations which would apply until legislation is passed. Once passed, some tribes will take over full regulatory authority. OSM will continue to regulate coal on reservations where tribes choose not to assume full responsibility.

The OSM regulations should clarify the jurisdiction of the federal government and tribes over coal mines on Indian reservations. The state of New Mexico has attempted to assert its regulatory authority over mines operated by Utah International and Consolidation Coal on the Navajo Reservation.

The Navajo Tribe has adopted its own strip mining regulations, and was awarded \$255,500 by OSM to develop the staff and technical expertise for implementing the regulations. However, without action by Congress, the tribe's enforcement authority is unclear. The legislation is expected to grant tribes authority over non-Indians who violate regulations.

The legislation was drafted by the Council of Energy Resource Tribes and OSM after CERT and several tribes sub-

contracted with OSM to study regulation implementation on each reservation.

Some environmentalists are concerned about how tribes might use the tribal "window" provision proposed in the draft legislation. The provision would give tribes the opportunity to develop regulatory programs that accommodate special local requirements such as cultural values and environmental and agricultural conditions. However, Dwight Kinsey of OSM's Denver office said the tribal proposals he has seen so far sound "reasonable."

Coal mines are now operating on the Navajo and Hopi reservations in the Southwest, and coal has been leased on the Crow Reservation in Montana. That mining is expected to begin in 1987.

— Marjane Ambler

Denver talks positively synfuel

The U.S. Synthetic Fuels Corp. board with its promise of loan guarantees and other federally-backed financial help, could make or break dozens of energy projects in the West. Colorado and Utah are sites for a third of the 60 projects applying for aid from the corporation, while Montana and Wyoming each hold another three. The board could lend a hand to about a half dozen projects with its current funding, and later add several dozen more if it obtains its full \$88 billion allocation in future years.

Those in business, government and environmental groups who traveled to Salt Lake City for the board's mid-December meeting — the first outside of Washington, D.C. — found few answers. The board didn't commit itself to any particular policies as it met in separate sessions with environmentalists and local government officials from communities that may be affected by the projects it backs.

What the board did for several hours in between, behind closed doors, SFC officials didn't say. The board is using the right to keep much of its work secret, a right granted by Congress in the legislation which created the SFC a year ago. Questions concerning the SFC's stand on specific projects receive a standard answer: Information about project details could raise or lower the proponent company's stock, a possibility the SFC says it will carefully guard against.

The 85-page briefing paper for the Salt Lake City meeting contained a number of policy questions the board must answer before it decides which projects it will support.

Industry observers said the board appears to be taking the "middle road" in terms of what it hopes to accomplish. And otherwise optimistic SFC officials said they're not so sure the agency will be able to lead the nation into creating a synthetic fuels industry producing 500,000 barrels of oil a day by 1987, and 2 million barrels a day by 1992, as was envisioned by Carter and other synfuel promoters just months ago.

The agency has said it will attempt to accomplish its job using the least amount of capital possible. Therefore, say SFC officials, the corporation, designed to operate like a private investment bank, will stress loan guarantees, price supports and agreements to purchase the fuels produced for government use — mostly by the military. It will downplay, or avoid altogether, direct loans and partnerships in projects.

The briefing paper released last month indicated that oil shale is the most economical of synthetic fuel choices. But the paper also said that a number of projects that would use coal,

rather than shale, to produce fuel are closer to completion.

Complicating the situation is the fact that most technologies for creating synthetic fuels from coal, shale and tar sands are untested on a commercial scale. And there's the growing doubt about whether world oil prices will rise as fast as companies say they will need to in order for synthetic fuel projects to be profitable. Synfuels is most likely going to be a game played just by the big leagues — the oil and coal giants that now dominate the conventional energy industry.

At the Salt Lake City meeting, an Occidental vice president complained that SFC material seemed to be putting "shale on the back burner," wondering aloud how committed the agency was to considering Oxy and Tenneco's \$6 billion shale project. Two weeks later, the two oil firms themselves put shale on the back burner, announcing that the Cathedral bluffs project near Meeker, Colo. was coming in way over budget and was being "delayed" indefinitely, forcing about 500 construction and other workers to be laid off.

— Gary Schmitz



Exxon quits for Love of elk

Exxon Company USA has quietly bowed out of the Bud Love Big Game Winter Range, northwest of Buffalo, Wyoming, where they conducted only a few days of seismic testing. Despite their earlier defiance of the Wyoming Game and Fish Commission's moratorium on the wildlife winter range, Exxon left as the elk moved in.

Steve Kettelkamp, area public affairs coordinator for Exxon said they "specifically left the area because they did not want to continue a controversy with the Wyoming Game and Fish Department."

Game and Fish, which owns one-half of the mineral rights in the 11-square-mile big game range, placed a mineral

exploration ban in the area until the commission could come up with an exploration policy. Exxon, however, owns the other half of the mineral rights which they acquired from the Love Land and Cattle Company.

Kettelkamp said Exxon had the legal right to enter the area, and they gave Game and Fish notice December 11 that they would do so. They began testing one week later.

Don Miller, spokesman in the Sheridan Game and Fish office, said he wished Exxon had given them more than a week's notice to work out the conflict. He said if Exxon had stayed, their presence and the blasting probably would have kept the elk from coming onto the range. He explained the elk are forced down from higher elevations after a certain amount of snowfall. If they had been afraid to enter their winter range, they would have spilled onto adjacent private land. Then there would have been the possibility of game damage on that land, problems the Game and Fish must compensate for.

Miller said Exxon's move was "just in time." On the morning of December 18, the last day Exxon was in the area, Game and Fish closed the range to vehicular travel after counting 29 elk on the range and over 100 above the area. "The next morning we counted at least 450 elk," he said.

Kettelkamp said Exxon is conducting seismic testing on private land just east of Bud Love. He said the information they accumulate there will help them analyze the prospects on the winter range and whether or not they will return to the area once the elk leave.

Tribal air may rout energy plans

The U.S. Supreme Court's decision in November to uphold the Northern Cheyenne Tribe's Class I clean air protection is important to energy development elsewhere in Montana.

The Assiniboine-Sioux Tribes of the Fort Peck Reservation in eastern Montana are presently involved in a study that could result in redesignation of their reservation to Class I. Class I allows little additional degradation of air quality and could affect plans for coal gasification plants in the vicinity.

Dave Johnson, head of the tribal air quality office, said monitoring indicates that two alternative sites for a Burlington Northern synthetic fuel plant could be precluded if the Class I status is obtained because of their proximity to the reservation. The favored site at Circle West would probably not be affected since it is downwind from the reservation. Other coal gasification plants have also been discussed in the area, but no specific sites have been named.

The tribes' decision could be espe-

(continued on next page)

BARBED WIRE

Adults only. The Hazen, North Dakota town council is considering an ordinance that would make it illegal for anyone under 17 years of age to throw a snowball.

The national interest is better served, too. After the U.S. Synthetic Fuels Corp. made a pitch for investments to a group of New York bankers, one financier told chairman Edward Noble, "Frankly, I do like to gamble, but when I do, I go to the race track. The air is fresher, the odds are better and you get to pick your own friends," the *Wall Street Journal* reported.

Canada moves south. Officials at New York's Chase Manhattan Bank returned a check to the county clerk in Gallatin County, Montana, reports the *East West Journal*. The bank had marked the clerk's check "Canadian check" and requested a "check for a like amount in American dollars."

This Bud's not for you. Anheuser-Busch, Inc. sent a letter to a distributor in Fremont County, Wyoming denying a "vicious rumor" that the company has made a major financial donation to the Sierra Club.

WESTERN ROUNDUP

(continued from page 3)

cially restrictive because they are close to the Poplar River coal-fired power plant in Saskatchewan. The Clean Air Act says that such emissions can affect baseline air quality calculations, in which case Saskatchewan Power Co.'s plant could use up 80 percent of the allowable pollution increments on the reservation. However, the act also says that a governor can disregard these international sources in computing pollution levels.

Coal development plans in the Williston Basin of North Dakota and eastern Montana are already restricted by the Class I status of the Theodore Roosevelt National Park just east of the Montana border.

Although Congress designated most of the country Class II, most national parks and wilderness areas are Class I. Congress also gave Indian tribes and local governments the authority to redesignate their air Class I after comprehensive studies and public hearings. So far, only two Indian tribes have used the voluntary redesignation authority, the Northern Cheyenne and the Salish-Kootenai of the Flathead Reservation, also in Montana.

The Northern Cheyenne's Class I status, which was won in 1977, was challenged by the neighboring Crow Tribe and several energy companies with plans in the area. However, on Nov. 30, 1981, the U.S. Supreme Court let stand an appeals court ruling that gave the Environmental Protection Agency the authority to grant the Cheyenne's request. The Crow feared the restrictive classification would inhibit their plans for a coal-fired power plant and a coal gasification plant.

The Salish-Kootenai tribes are in the final stages of obtaining their Class I status, which is expected to be announced in the *Federal Register* early in January. It could affect timber industries in the area, just west of Glacier National Park.

— Marjane Ambler

Railroad must face siting council

Chicago & North Western Transportation Co. and the Union Pacific Railroad have failed in their attempt to convince the Wyoming Industrial Siting Commission that it does not have jurisdiction over a railroad connector line the two firms plan to build from Wyoming's Powder River Basin coal fields to Nebraska.

The Wyobraska Landowners Association successfully argued at a public hearing Dec. 18 that the rail line would cost more than \$85 million, the current cutoff for siting commission jurisdiction in the state, and that the Interstate Commerce Commission did not preempt such state regulatory authority. Chicago & North Western used those two arguments in applying to the ISC for a certificate of insufficient jurisdiction.

Wyobraska, a group of Wyoming and Nebraska landowners, is an affiliate of the Powder River Basin Resource Council. Its members are concerned about how the rail line will affect irrigated farming and grazing operations along its route. The siting decision gives the state the authority to consider impacts from the line and to require mitigation efforts from the companies if problems occur.

In July of 1981, the ICC approved the line with certain conditions; Wyobraska appealed the decision. In December, the railroads obtained financing for the \$460 million project without receiving federal loan guarantees.

— Marjane Ambler



Geothermal area east of Yellowstone

Geothermal drilling sales condemned

Even a conservative Republican can block energy development it seems — if Yellowstone National Park is involved.

At a hearing in Casper last month, Wyoming Sen. Malcolm Wallop (R) upstaged environmentalists with his passionate, unequivocal stand against geothermal leasing in an area called Island Park to the west of Yellowstone.

"I personally feel we would be making a hell of a mistake in leasing Island

Park," Wallop told the small group gathered for the Senate Public Lands Subcommittee hearing.

The position puts him at odds with an administration-endorsed bill now before the House, a bill introduced by fellow Republican and Energy and Natural Resources Committee chairman Sen. James McClure (R-Idaho).

The administration-endorsed amendments to the Geothermal Steam Act of 1970, aimed at streamlining leasing procedures, would set up buffer areas around Lassen Volcanic and Yellowstone national parks. Sen. John Warner's (R-Va.) Senate bill included no park protection provision at all and McClure, whose committee will mark up the bill, supports the latter approach.

While Wallop agreed on the need to encourage geothermal energy production, he said neither bill provides adequate protection for Yellowstone.

Sen. John Melcher (D-Mont.), the only other member of the subcommittee who attended the hearing, expressed similar strong feelings.

Some 200 geothermal lease applications have been filed in the Island Park area, which lies within the Targhee National Forest near the park's western boundary. Two U.S. Geological Survey geologists, Robert O. Fournier and Robert L. Christiansen, said the configuration of underground plumbing between the two areas is still unknown. If the hot waters of the two areas are connected, development in Island Park could damage Yellowstone's geysers and other geothermal attractions, they said.

The geologists indirectly supported leasing in Island Park, however, if certain precautions could be assured. Any water extracted at Island Park should be reinjected, they said. In addition, water pressure should be monitored a short distance from development wells. If any drop in water pressure occurs, then development should be halted, they said.

If these steps were taken, damage to Yellowstone from development at Island Park would be "extremely unlikely," Christiansen said.

But neither Wallop nor Melcher was willing to settle for such a qualified assurance.

"You're here seeking mitigation of potential damage," Wallop said. "I'm here to satisfy myself that there is no potential damage."

Wallop said a likely outcome of Congress's deliberations on the geothermal bills would be the banning of geothermal exploration and development near Yellowstone, while allowing passage of the other proposed amendments to the Geothermal Steam Act.

In the last session of Congress, amendments to the geothermal act, which included stringent park protection language, died in a House-Senate conference committee. This session, markup of a Senate bill is expected early in 1982.

— Joan Nice

Teton drilling ban upheld by court

A recent federal judge's decision has frustrated, at least temporarily, an effort by oil interests to challenge the secretary of the interior's power to withdraw individual wilderness areas from mineral exploration.

On December 23, Federal District Judge Ewing T. Kerr upheld an Interior Board of Land Appeals (IBLA) decision to reject oil and gas lease applications in the Teton Wilderness in Wyoming, an area north of Jackson Hole and south of Yellowstone National Park. This area is currently withdrawn from mineral exploration under an order issued by then Secretary of the Interior Julius A. Krug in 1947.

The "Krug memorandum" makes

However, in the legal opinions of both Sanderson and that of the EPA legal counsel's staff, there was no conflict as long as he did not personally represent clients before the agency while consulting. Sanderson's potential appointment troubles environmentalists, who are already worried about the direction the EPA is taking under the Reagan administration.

JUGGLING IDAHO AGENCIES

Lending credence to Idaho's reputation as an energy poor state, Gov. John Evans (D) has decided to tuck the state Office of Energy into the state Department of Water Resources. Not only will the move save money, said Evans, it will also keep energy resource development on an equal footing with "our other valuable resources, water and land."

OIL AND REPUBLICANS MIX

The oil industry is investing heavily in conservative politicians, according to a Boston *Globe* analysis of U.S. Senate and House contributions made by political action committees. Between 1978 and 1980, oil PAC contributions rose from \$2.14 million to \$4.52 million; 81 cents of each dollar funded Republican candidates, particularly Republican challengers. A lobbyist for the Independent Petroleum Producers Association explains that although their membership includes Democrats, "It just so happens that the only way to get rid of Tip O'Neill and liberal chairmen is to take over the House." Oil money apparently influenced the 1981 debates over the new tax bill, as Democrats and Republicans fought over giving larger tax breaks to the oil industry. The new bill hands the industry more than \$11 million in tax breaks over the next five years.

HOTLINE



Berkeley Pit, Butte, Montana

MORE ANACONDA LAYOFFS

Citing low copper prices and record losses of over \$50 million last year, Anaconda Copper Co. announced layoffs of 200 more employees at its Berkeley Pit copper mine in Butte, Mont. According to Frank Gardiner, general manager of the Butte operations, these layoffs are only the first action in a continuing effort to keep the Berkeley Pit operating. Although most of the laid-off workers come from the pit operations, Anaconda expects to continue to process 44,000 tons of ore daily by mining a richer area of the pit. While Anaconda was once the major employer in Butte, the latest layoffs leave only 1000 workers on their payroll, or only 5.8 percent of the Butte workforce.

ADDING TO THE RANKS

Another conservative westerner soon may be appointed to the Reagan administration. Environmental Protection Agency officials say the appointment of Jim Sanderson, a Denver lawyer who consulted for the EPA during part of 1981 and has done legal work for the Mountain States Legal Foundation, the conservative law firm formerly headed by Interior Secretary James Watt, will be announced soon. If he gets the job of assistant administrator for policy and resource management, Sanderson would supervise budgetary matters, legislation and overall policy for EPA. Sanderson's work as a consultant for the EPA last year raised the question of conflict-of-interest because his law firm was representing clients before the agency.

stipulations for oil and gas leasing and development in the Jackson Hole area, and in doing so, withdraws the Teton Wilderness in the Bridger-Teton National Forest from mineral exploration.

Upon denial of their lease applications by the IBLA, a group of oil interests from four western states took Interior to court to challenge the Krug memorandum.

Judge Kerr's decision substantiates the validity of the Krug memorandum and the subsequent IBLA ruling, rejecting the oil interests' claim that Congress, in the 1964 Wilderness Act, intended all such areas to remain open for mineral development.

Kerr's opinion, however, emphasized that the withdrawal is an exercise of the discretionary power of the secretary of the interior and may be revoked at any time.

James R. Leamed, a Cheyenne lawyer and plaintiff for the oil interests, said they do not agree with Kerr's interpretation. In their view, the Wilderness Act superseded the Krug memorandum and therefore complete minerals exploration is required in each area before any withdrawal.

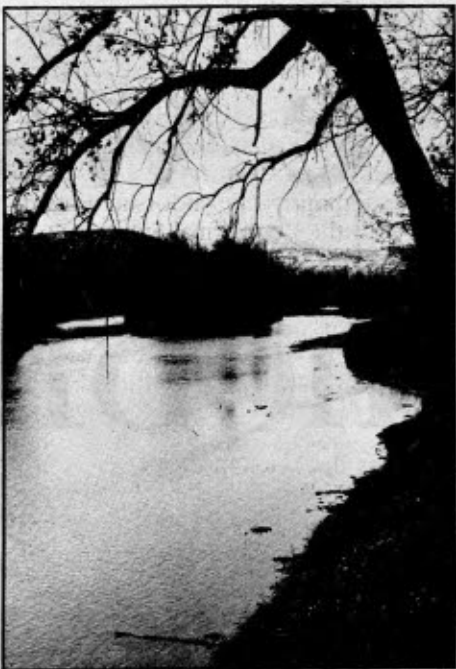
Sierra Club Legal Defense Fund attorney Bill Curtiss said the decision clearly supports the discretionary powers of the secretary of the interior, a mixed blessing in conservationists' view. Although the decision "recognizes the authority of the Secretary of the Interior to lease (minerals in wilderness areas)" it also "confirms his (the secretary's) ability to decline to lease based on the potential environmental effects of oil and gas development," according to Curtiss.

Kerr's decision "takes the pressure off (of the Teton Wilderness)," said Reid Jackson, Supervisor of the Bridger-Teton National Forest, who said he is relieved the Forest Service does not have to make a recommendation on mineral leasing in the ecologically sensitive area for the present.

The fate of the Teton Wilderness is still uncertain. Judge Kerr's decision

reaffirming the authority of the Krug memorandum, which is currently under review by the Department of the Interior, can be revoked by Interior Secretary James Watt at any time.

— Susan Tweit



Tongue River

Mining ban petition denied

Montana's Tongue River will not be declared unsuitable for coal mining despite the efforts of the Northern Plains Resource Council and three other rancher/conservation organizations.

The Montana State Lands Department and the U.S. Office of Surface Mining made their decision in December, saying "there was not sufficient evidence to support the petition of the NPRC seeking to prohibit mining in the 304-square mile area along the Tongue River in southeastern Montana."

Research and studies gathered by the NPRC cite possible soil erosion prob-

lems, reclamation problems and water quality troubles if mining is permitted along the river (*HCN*, 10/30/81).

But according to Sandra Johnson with the State Lands Department, the NPRC research "was too limited and insufficient for that volume of land." She said there are pockets of land unsuitable for mining along Tongue River, but that those small sections can be specially handled to insure against major environmental problems.

Margaret MacDonald with NPRC said their research showed a single mine probably wouldn't have "significant effects on the quality of the river." But it is unlikely that only one mining company will take advantage of the coal-rich area.

Currently, only one company has filed for a permit, Montco of Billings, Montana. According to Brace Hayden, administrator of the State Lands Department's Mine Land Reclamation Division, Montco had been monitoring wildlife and water quality in the area, plus doing intensive soil sampling for one to two years before they even applied for a mining permit in November 1980. The State Lands Department has not granted the permit yet, but Hayden said there are currently no major problems to prevent the permitting and he expects the department to make a decision during 1982. To date, no other companies have filed for a permit, Johnson said.

MacDonald said she now expects the U.S. Department of Interior to consider leasing land along Otter Creek for coal development. Otter Creek is a major tributary of Tongue River, a creek that OSM Director James Harris said already has poor quality water and should be thoroughly investigated before mining is allowed.

MacDonald also said she expects the Tongue River Railroad to file with the Interstate Commerce Commission for permission to construct a rail line from Miles City along the river, with a possible spur up Otter Creek. According to area ranchers (*HCN*, 10/30/81) the rail interest means that Montco is just the beginning.

Mont. faults USGS on park oil lease

Efforts by the Montana Department of Fish, Wildlife and Parks (DFWP) to get the U.S. Geological Survey to do a thorough, detailed environmental assessment for the proposed oil drilling near Makoshika State Park in the badlands near Glendive in far eastern Montana have gone unheeded, the department said.

The draft EA was released from the USGS on November 2, and Dave Conklin, regional parks manager with the DFWP, said the draft document was flimsy, "lacking consideration of alternatives," containing no consideration of future problems if oil is found.

The USGS plans to release a final EA by January 15, too short a time to produce a thorough study in Conklin's opinion.

Southland Royalty, a company based in Denver, applied for a drilling permit from the USGS in September. The butte site where Southland wants to drill is not in the park. Conklin explained the proposed site is in an adjacent area of 2,000 acres the DFWP has been trying to lease from the Bureau of Land Management since 1976. The DFWP has made slow progress toward increasing the park's acreage since the original 160 acres of the current 880 were given to the state in 1953.

The leasing of the BLM land has been held up, for reasons unclear to Conklin. "Everything we do is put on hold, while the oil (company) requests are proceeded with," he said.

Conklin said the DFWP is not gunning against oil development, but just opposes this particular operation that would be highly visible from popular areas of the park. Ten feet would be leveled from the top of the butte site to build the one-quarter to one-half acre drill pad. Road construction to the site would also be required.

Conklin said he is concerned about future problems that may arise if oil is discovered. "We (DFWP) recently discovered that Southland Royalty must drill before April 1 or they'll lose options on other leases close by, some of which are in the park," Conklin said. "If they find oil, they'll drill more." That is the reason, he said, for wanting to conduct a long-range study of the area.

A short public comment period of about two weeks was allowed by the USGS on its draft EA. In a November 17 letter from James W. Flynn, director of the DFWP to Thomas Richmond, district supervisor of the USGS in Billings, Flynn said his office received a copy of the draft EA on November 12 and was given only seven days to respond. He also complained that "no range of alternatives is discussed" and that the decision that no significant impacts would result from the drilling is not supported by the analysis.

Flynn also claimed that a statement in the EA, "Extensive consultation between the State Fish and Wildlife and BLM has determined that this well site can be located with minimal environmental damage," is "absolutely false."

Jim Mitchell, environmental scientist with the Billings USGS, said his office had only one meeting with the DFWP and the BLM directly related to the EA, but that they had many previous meetings concerning the drilling.

Mitchell said the final EA includes comments the USGS received during the public comment time, although, he said, some indicated that people weren't informed on the subject. He also assured that alternatives — like the use of submersible pumps and off-site facilities — would be considered in the final EA.

INDUSTRY HITS ROYALTY HIKE

Claims of economic hardship underscored energy industry representatives' objections to proposed increases in state mineral royalty rates and other changes in state leasing regulations at a hearing before the Wyoming Land Board in Casper. Trona industry representatives objecting to the proposed royalty rate, claimed higher royalty rates would boost production costs, putting them at a disadvantage in highly priced-competitive foreign markets. Noting lower royalties levied by other states, some oil and gas representatives suggested lowering royalty rates to signal the state's desire for mineral development. An Exxon representative called for an adjustment in royalties to compensate for inflation, claiming Exxon has no objection to paying royalties based on "real growth" but does object to royalties based on inflation. Coal production would be slowed by increased royalty rates, according to one coal industry representative, because companies will be forced to absorb the increased cost since they are selling the coal at fixed rates. Representatives of two environmental groups at the meeting supported the increased rates but suggested changes in other leasing regulations.

WATER QUALITY SET

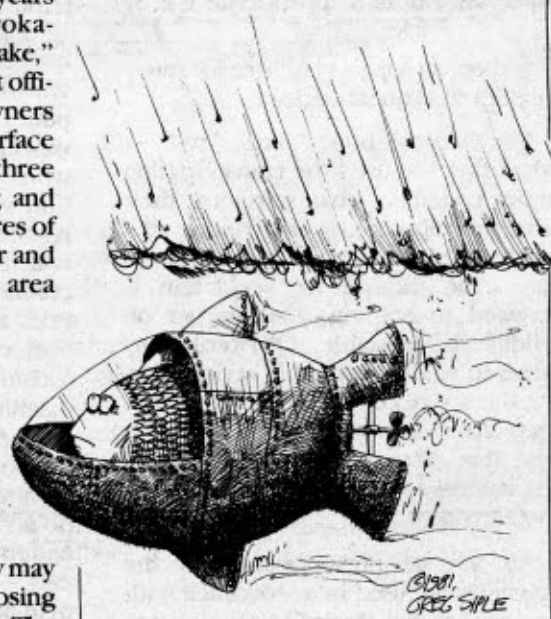
Bowing to a new state rule that restricts dissolved oxygen in the Snake River, the Bureau of Reclamation is renegotiating its contract with users of the American Falls Reservoir in southern Idaho to meet the new standard. Only 5 parts per million of oxygen are now allowable, and new efforts to de-air the reservoir's water may be needed.

WHOOPS IN THE WILDERNESS

Oil and gas leases issued two years ago that overlap the Absaroka-Beartooth Wilderness were "a mistake," according to Custer National Forest officials, who are now trying to get owners of the leases to agree to "no surface occupancy" stipulations. The three leases would allow road-building and drilling. One includes over 900 acres of wilderness, the other two only four and nine acres respectively, in the area known as the Beartooth Face.

DIMMING THE DUKE

Late actor John Wayne's memory may be golden in Hollywood, but it is losing some luster in Washington state. The proposed 225-mile John Wayne Trail from central Washington to the Idaho border is running into objections from ranchers who want to buy the right-of-way. In addition, faced with a budget crunch, the trail may be scrapped by lawmakers. It was originally authorized in a \$3.5 million appropriation at the end of the Washington's 1981 regular legislative session. Now, however, Gov. John Spellman wants \$227 million in budget cuts from the legislature and the trail is "not a high priority" on House Speaker Bill Polk's list. A number of ranchers have been trying to acquire the land along the right-of-way — an old rail line — for years and don't want the trail going through their lands. In addition, some county commissioners have sent a strong protest, saying that little or no discussion took place before the trail went through.



ACID RAIN DAMAGE

A study completed by the United Mine Workers indicates that if, in an effort to reduce the environmental damage caused by acid rain, Congress requires a 10-million ton annual reduction of sulfur dioxide emissions in the eastern United States over the next ten years, 89,000 jobs will be lost in the coal fields. Economic losses to 12 eastern coal producing states would be \$6.3 billion. However, the National Wildlife Federation evaluated the vulnerability of 27 eastern states to aquatic life, lakes, soils, crops and building damage from acid precipitation. Fifteen states are "extremely vulnerable", according to NWF, and ten are moderately vulnerable. Congress is considering measures to curb acid rain as part of the Clean Air Act revisions now being debated.

The Potholes compromise

Paving the way for snowmobiles in the parks?

by Jill Bamburg

On a recent weekend in mid-December, Interior Secretary James Watt enjoyed his first winter visit to Yellowstone National Park. His mode of transportation was the snow machine, vehicle of choice for 70 percent of the 50,000 people who visited Old Faithful in the winter of 1979-80, the last good snow year.

To his south lay Grand Teton National Park and 29,000 acres of snowmobiling controversy known as the Potholes. It will take 39 inches of snow cover to open the Potholes; it will take the approval of Washington to make that opening permanent. As of this writing, the area had neither, but the odds were even as to which would come first.

Snowmobiles are currently permitted in 20 national parks in the lower 48 states and there is steady pressure from the snowmobiling community to gain access to additional park areas. Given Secretary Watt's personal enthusiasm for off-road vehicles and his political commitment to "improved access" to public lands, the snowmobilers could see their wish come true in the next few years.

Under current national policy, in effect since August 1979, "snowmobiles may be permitted in units of the National Park System as a mode of transportation to provide the opportunity for visitors to see, sense and enjoy the special qualities or features of the park in winter...Where permitted, snowmobiles shall be confined to properly designated routes and water surfaces which are used by motorized vehicles or motorboats during other seasons."

In short, the snowmobile has become the winter automobile in a number of national parks.

Snowmobilers would like to see that number increased, while some conservationists would like to see snowmobiles eliminated from the parks altogether. There does not appear to be tremendous pressure to open parks to off-road use, but a compromise decision opening up 16,000 acres in the Potholes area of Grand Teton National Park could set a precedent for cross-country snowmobiling in other parks.

The International Snowmobile Industry Association (ISIA) may find the Reagan administration sympathetic to its desire to eliminate the "red tape" — i.e., public involvement process — cur-

rently required for opening, closing and changing snowmobile routes. And Watt could renew the effort he made last summer to get President Ronald Reagan to rescind Executive Order 11644, an order issued by President Richard Nixon requiring public land agencies to develop regulations that would protect those lands from inappropriate use by off-road vehicles.

Is there an appropriate use for snowmobiles in national parks?

The national policy says, "yes" — when they are used for transportation under conditions that minimize their adverse impacts. By restricting the machines to roads and frozen water surfaces, the damage to vegetation is reduced to nothing. The impact on wildlife is debatable. Obviously, any stress to wildlife is doubly serious during the severe conditions of winter, but there are at least two studies that indicate that cross-country skiers subject the animals to more stress than snowmobilers do.

All of that presupposes that the machines are used in accordance with park policy. But Destry Jarvis, director of federal activities for the National Parks and Conservation Association, sees abusing park policy as a real problem. Since the snow machines have the ability to go off-road, it is likely some of them will. In order to prevent that illegal use, parks would have to beef up patrols and hire additional personnel for the off-season — steps that are unlikely in these times of major budget cuts.

Jarvis also cites conflicts with other park users and wildlife impacts and harassment as reasons for his opposition to snowmobiling in national parks. But underlying his specific objection is a far more general philosophical view. The parks "are to be experienced primarily for the inner rewards that the resources themselves provide," rather than the rewards of more physically active, conventional recreations. It is the difference, he says, between standing at

Glacier Point in Yosemite and gaining inspiration from the view or jumping off Glacier Point and hang gliding 3,000 feet to the valley floor.

Although the present national policy permits snowmobiles as "an alternate form of access when snow cover interrupts normal vehicular access to a park," it echoes the distinction that Jarvis makes. In a section of background material published August 13, 1979, with the final version of the national policy, it is noted that "While the service encourages those recreational uses which draw their meaning from association with and direct relation to park resources and which are consistent with the protection of such resources, certain recreational uses of snowmobiles are not viewed as appropriate in National Parks. These recreational uses include, but are not limited to, skilled machine handling, endurance riding or racing."

In other words, as Grand Teton chief naturalist Pat Smith put it, the national policy says that snowmobiling in national parks "should be a means to an end — enjoyment of the park — rather than an end in itself."

At present, Grand Teton is the exception. Under a compromise initiated last winter and expected to be published as a final regulation early this year, off-road snowmobiling will be allowed on 16,000 acres in a 29,000-acre area known as the Potholes. However, it will be prohibited on Jenny Lake, an area popular with cross-country skiers.

There are few other exceptions to the national policy (outside of Alaska) — in areas like Acadia National Park in Maine and Voyageurs National Park in Minnesota, where snow machines are permitted on designated trails that are not used by motorized vehicles in other seasons. But the Potholes is the only area outside Alaska where the Park Service makes an exception to the transportation thrust of the national policy.

What makes the Potholes so different?

Grand Teton Park Superintendent Jack Stark, architect of the "Stark compromise," thinks there are three major differences. One is the historic use of the area by snowmobilers, a use that dates back to the early 1960s. The second is that, given sufficient snowfall, there is little or no environmental damage as a result of snowmobiling. The third is that there are fewer miles of road in Grand Teton than there are in some other parks, like Yellowstone, and the extra open terrain helps to make the snowmobile experience in the park worthwhile.

A fourth difference that Stark might have cited but did not is the presence of a powerful and well-organized business community in nearby Jackson Hole that has put pressure on the Park Service and the Wyoming congressional delegation to "Save the Potholes" — i.e., keep the area open to snowmobiling.

The Potholes first surfaced as a separate issue in August 1979, when the Park Service published its proposed final snowmobile policy. An earlier draft, published in December, 1978, had expressed the same basic philosophy as the final policy but had listed the Potholes area as one of three exceptions to the national policy. The August rules eliminated all three exceptions.

The business community of Jackson Hole, which had just published a four-color brochure touting snowmobiling in the Potholes as one of the area's major winter attractions, was furious. By October, the National Park Service agreed to postpone implementation of the national policy in Grand Teton National Park pending the outcome of public hearings.

In February, 1980, the park released an environmental assessment on the issue, recommending implementation of the national policy. In May public hearings were held which indicated substantial Wyoming support for off-road snowmobiling.

Snowmobiling and business interests contended that there was little or no environmental damage as a result of snowmobiling in the Potholes (a posi-



Is there an appropriate use for snowmobiles in national parks? The national policy says, "yes."

tion supported by the environmental assessment) and argued that the closure would be harmful to the local economy. Conservationists, on the other hand, were less concerned with the specifics of the immediate situation than with the precedent that would be set by a departure from the national policy.

Nonetheless, when the final deadline for public comment rolled around, 60 percent of the 174 letters received favored snowmobiling only under the restrictions of the national policy, 12 percent favored no snowmobiling at all and 20 percent favored off-road snowmobiling. All but two of the letters favoring off-road snowmobiling came from Wyoming.

Going into the winter of 1980-81, the issue was still undecided. The regional office of the National Park Service decided to appoint a special committee of five individuals from outside the Park Service to review the issue and make recommendations. Former astronaut Wally Shirra headed that committee, which included Teton County Commissioner Jerry Tracy, Ron Tipton of the Wilderness Society, Jan Wilson of the Wyoming Recreation Commission, and professor John Hunt of Utah State University.

The committee looked at the Potholes area (there was not enough snow for snowmobiling) and at the issues surrounding it. The group voted 3-2 to recommend closure of the area, largely on the grounds of the precedent it would set.

Despite that recommendation, Stark was inclined to push his compromise

proposal, soon to be published as a proposed final rule.

Looked at from the standpoint of Grand Teton National Park alone, the compromise has good points. The environmental assessment prepared on an earlier, more expansive version returned a verdict of no significant impact. The snow depth (39 inches are required for the area to open) protects the vegetation, and the big game animals have moved out of the area by the time it opens. About the only physical impact resulting from snowmobiling in the Potholes is the possible displacement of a portion of the park's coyote population.

From the recreation standpoint, the compromise also appears to work. While the Potholes is virtually a perfect playground for snowmobilers, it is not a particularly exciting area for cross-country skiers. By "zoning" Jenny Lake for skiers, Stark has completed a unit that gives cross-country skiers exclusive access to a far more interesting area along the base of the mountains west of the Teton Park Road.

There remains, however, the disturbing question of whether the Potholes decision sets a precedent that weakens the national policy.

Jack Stark thinks it does not. He believes that the national policy is both necessary and sound, but he feels that there has to be room in the system for some deviation. "If you make a national policy and implement it without exceptions, you run the risk of losing the national policy."

Sierra Club board member Phil Hocker, who lives in Jackson Hole and testified before the Potholes study committee, believes that Stark may be underestimating the extent to which the Potholes decision sets a precedent. "The problem is that the general case is always made up of a number of specific cases. When you get down to these individual cases, the pressure to change is concentrated and the policy is diffuse, and the people aren't generally here to... (remind park administrators) that they're dealing with ideas that date back to 1916. If you forget all this, you end up with a bunch of 'county parks.'"

The notion of "county parks"—parks run according to the desires of the local community versus those administered for the benefit of the entire nation, present and future—is a recurring theme in Jackson Hole and elsewhere in the national park system. Local communities tend to take a proprietary interest in their neighboring parks, and snowmobilers tend to be well organized pressure groups on the local level.

In most cases, their lobbying is not for the exceptional off-road privileges granted in Grand Teton, but for simple access to parks where snowmobiling is now prohibited. Derrick Crandall, vice president for public affairs of the International Snowmobile Industry Association, said that his organization is basically in agreement with the transportation thrust of the national policy. He noted, however, that grass roots pressure played an important part in the decision to open 10 of the 20 parks where snowmobiling is now permitted.

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Jill Bamburg is a freelance writer in Jackson, Wyoming. This article was paid for by the HCN Research Fund.

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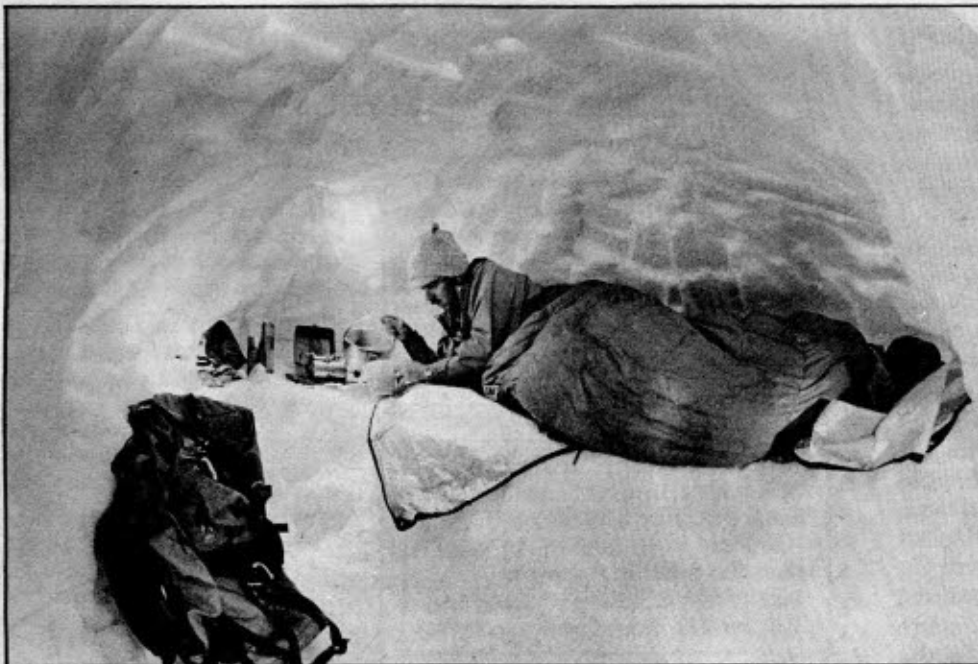
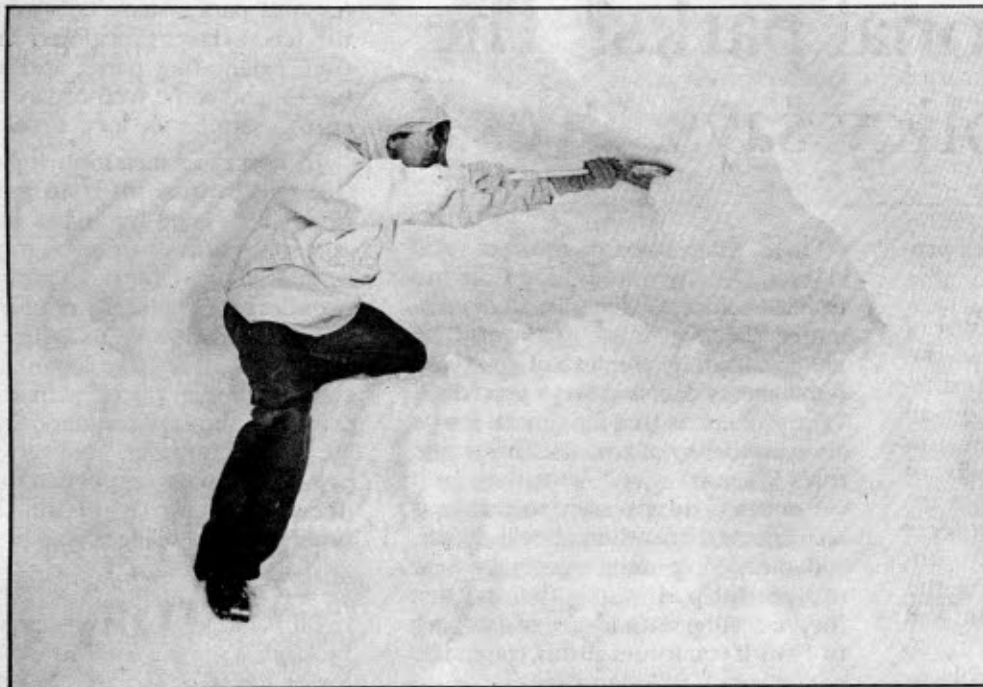
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Wintry havens

*Story by Ron Watters
Photos by Phil Scofield*

High in the mountains, far away from the nearest wood-heated cabin, the wind is blowing and the mercury plunging. Sound like a bone-chilling winter camping trip? Could be. Especially if you're wondering about how adequate your well-worn sleeping bag really is. It's a time like this that a snow shelter comes in handy. Snow is an excellent insulator. It may be a windy, 20 degrees below zero night, but inside a snow shelter, it's quiet and calm and the temperature will be many degrees warmer than outside.

A snow shelter requires more time to build than to erect a tent, and on a winter trip, you'll need to stop one or two hours earlier than usual to allow for the extra time. As your shelter-building skills improve, however, construction time decreases.

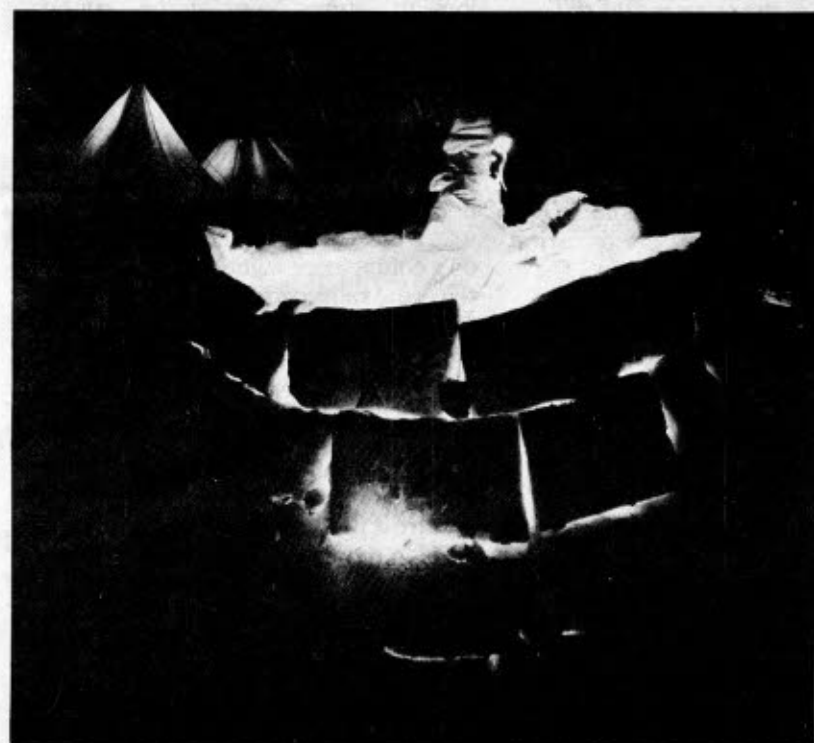
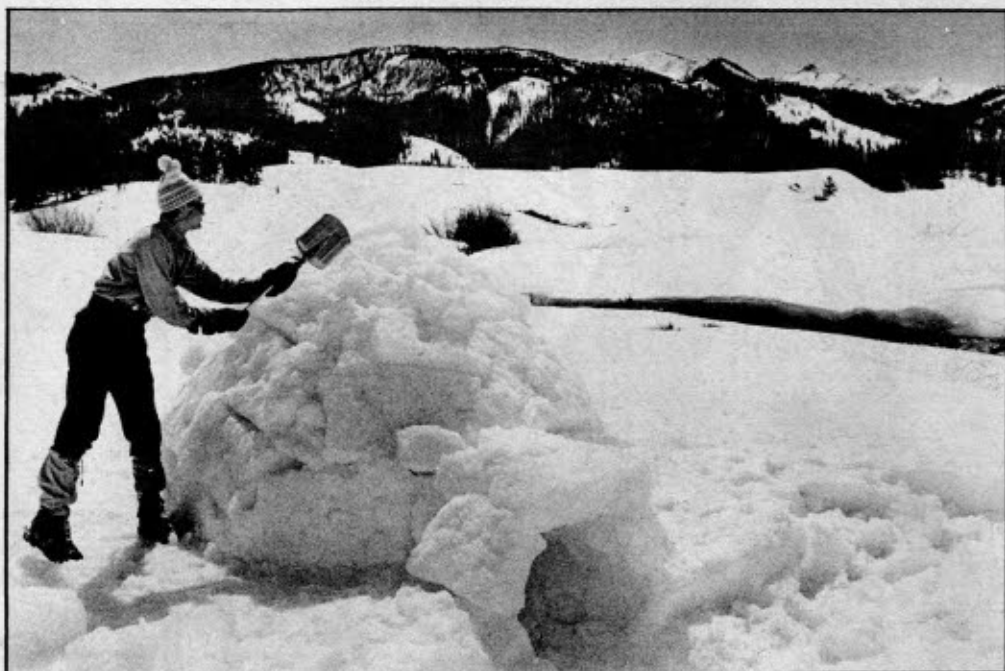
Snow cave

Build a snow cave in an area where the wind has deposited a deep drift of snow, such as on the lee side of hills, ridges or gullies (above). Dig straight into the drift. Keep the entrance relatively small — not any higher than your waist while standing. This keeps the cave well-insulated.

After digging a couple of feet into the drift, start enlarging the interior (center). Two people working together can expedite the process. One person can dig out the cave's interior while the other, standing at the entrance, scoops snow outside and out of the way.

As the interior of the cave is enlarged, form a platform above the floor on which the sleeping bags will be placed when the cave is complete. Elevated sleeping platforms are warmer because warmer air within the cave rises. Carve the ceiling of the cave in a dome shape to provide overall structural strength.

The cave is complete in the lower photo. Be sure to poke a small hole in the cave roof for a supply of fresh air. If a stove is used, make a larger hole directly above the stove to rid the cave of exhaust fumes. A candle inside will provide soft diffused light reflecting off the white walls, more than enough to cook, read or organize equipment for the following day.



Igloo

To begin the igloo-building process, mark out a circle on the snow outlining the igloo's base (top left). Keep the diameter of the igloo circle between seven and eight feet — any larger greatly increases the probability of collapse while you build.

Snow saws (such as the one laying on the floor of the igloo picture at lower right) are by far the best tools for cutting blocks. Other improvised implements (such as the tail end of a ski) are very difficult to use.

If the snow is hard-packed you can cut blocks directly from the ground cover. Otherwise you may have to make a quarry by stomping out a large (12' x 12') areas with your skis. Let it sit for 30 minutes to an hour; the snow will consolidate into a harder mass.

Using the snow saw, cut the largest blocks that can be handled and the consistency of the snow permits. A good size of block is 6 inches thick, 18 inches high and 24 inches long.

Dig an entrance hole in front of the igloo circle, place a large block over it and continue placing blocks all around the circle. Lean this first row of blocks toward the center of the igloo (left center photo).

Unfortunately, most sources on igloo-building fail to explain the most important principle: strength by a lattice of touching corners. When the

blocks are placed, only the corners of adjacent blocks should touch. If any portion of adjacent blocks touch other than corners, the blocks will tend to rotate out of place and destroy the structural strength of the igloo. Put a block in place and, if necessary, use the snow saw to cut concave sides on the block so it is supported only by corners (notice the touching corners in the night time photo at lower left).

After a couple of layers of blocks have been placed, the strength of the igloo is established by the network of touching corners. Continue to place and lean blocks more and more toward the center as the igloo gains height. The last few blocks are relatively easy to place since by now the lattice of corners has provided a strong foundation.

After the igloo is complete, chink the cracks with small blocks and pile loose snow on top of the structure (upper right). For a traditional look, an arched entrance can be constructed over the doorway. Like a snow cave, a sleeping platform can be made inside for the sleeping bags.

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Ron Watters is associate coordinator of the Idaho State University outdoor program.

Avalanches

Even a small to moderate avalanche can uproot mature spruce. A large one can destroy buildings.

At the end of the last ice age about 15,000 years ago, timberline in the Rockies was fairly uniform. As the ice age ended and the climate warmed, snowfall increased. With the loading of snow on the steep mountain slopes, avalanches began thundering down.

The uniform tree line was disturbed and the cascading snow carried soil, vegetation and debris down the slopes. According to Jack Ives, professor of mountain geocology at the University of Colorado, "In avalanche shutes, you will find the flora of an alpine ecosystem 1,000 to 2,000 feet lower than might otherwise be expected."

Avalanches, the bane of the backcountry skier and commercial ski area, have had a tremendous impact on the formation of the Rockies and the other mountain ranges of the world. "Soil development in avalanche shutes is retarded compared to other areas," said Ives. "Erosion is enhanced and soil is carried to stream beds at lower elevations. Combined with spring rains, this encourages mud flows and soil distribution."

Avalanche activity also promotes variety in wildlife habitat. Frequent avalanches prevent the growth of conifers in their slide paths. However, other types of vegetation, like aspen and willows, can bend somewhat under the stress and survive smaller avalanches. The variety of vegetation often forms prime wildlife habitat.

Most avalanche activity occurs away from human activity. However, when people and avalanches meet, the people are invariably the losers. In the Santa Valley in Peru in January of 1962, an ice avalanche thundered 10 miles descending about 13,000 feet at a speed of nearly 40 miles an hour. There were about 106 million cubic feet of ice involved. About 4,000 people were killed and nine small towns destroyed.

Eight years later, the same avalanche path slid again as the result of an earthquake, burying the city of Yungay and killing 20,000 people.

The worst avalanche disaster in the U.S. occurred in March of 1910 in Washington state. Two snowbound passenger trains were swept into a steep canyon near the town of Wellington, killing 96 people. The same month, 62 workers were killed in Canada's worst avalanche disaster at Rogers Pass, British Columbia when they were trying to free a train that had been stalled by an earlier avalanche.

In the western United States, there are about 10,000 avalanches yearly. About one percent of these harm people or property. They account for an average of seven lives lost and \$300,000 property damage each winter.

These effects of avalanches have given

rise to a subculture of people who are intensely involved in the study of snow. In order to predict avalanches and assess their potential damage, researchers and ski area snow safety workers have become nearly fanatical about the subject of snow.

John Stratton, a snow safety patrolman at Snowbird ski area in Utah and an instructor at the American Avalanche Institute (AAI) in Jackson, Wyoming, said, "I've been working at this for ten years and every year I learn something new."

Through the careful study of snow physics, researchers are uncovering the secrets of avalanches. Rod Newcomb, founder and head of AAI said, "First, you have to understand the physical properties of the snowpack. Then the other things, like route finding and terrain analysis in the backcountry, fall into place."

A massive avalanche with enormous destructive power begins with the accumulation of one of nature's most beautiful and fragile creations — the snowflake. As soon as snowflakes accumulate on the ground, or on an old snow layer, they begin to change — to metamorphose. The type and rate of change depends primarily on the temperature within the pack.

There are two primary processes by which snow metamorphoses: temperature gradient (TG) metamorphism and equitemperature (ET) metamorphism. Though true snow freaks would undoubtedly cringe at the oversimplifi-

cation, TG snow is "bad" and ET snow is "good," when it comes avalanches — or, rather, to the lack thereof.

The term "temperature gradient" refers to the variation in temperature through the snow pack. If the difference in the temperature through the depth of the snow is greater than 10 degrees Celsius per meter of snow, TG snow is forming and the snowpack will be weaker. If the temperature difference is less than that — the snow is said to be forming at "equitemperature" — ET snow is forming and the snowpack will generally be stronger.

As snow changes under either of these processes, the crystals that have fallen gradually become rounded. Under ET metamorphism, the change is relatively slow and the grains are smaller than with the TG process. The snow grains then form bonds among themselves in a process known as sintering. It is the strength of these bonds which determines the strength of the snow layers and of the bonds between adjacent layers.

TG snow also sinters, but the grains it forms are larger and the bonds among the grains correspondingly weaker. The classic analogy is: Imagine a large box filled randomly with basketballs. The points at which the basketballs touch each other is analogous to where the snow grains will form their bonds. The balls will touch in a fairly large surface area, but there will be relatively few bonds.

Now, fill the same box with tennis balls. The places at which the balls

touch will involve less surface area, but there will be more balls and more points of contact. Consequently, the bonding among the smaller tennis balls will be stronger than the bonding among the basketballs. Similarly, smaller-grained ET snow forms a stronger snowpack than the larger TG grains. If the process continues long enough, TG snow eventually metamorphoses into "depth hoar," an ice-like, loosely sintered layer at the ground level which presages the most dangerous types of avalanches.

Other types of snow also form within the snowpack. Melt-freeze metamorphism occurs when snow melts, then re-freezes, as the name implies. In addition, surface hoar, that annoying substance that builds up on car windshields on a cold winter night, can form on the top of the snowpack, then be covered by a snowfall before it is burned off by the morning sun. This type of deposition forms a very weak, almost invisible layer on which an avalanche can slide.

Avalanches slide on what is referred to as a "bed surface." This is a weak layer of snow that has a slab on top of it. When the stress of other forces becomes too great — from new snow loading, stress over time, or even the weight of a single skier or animal — the bonds between the weak layer and the slab collapse and the hill will slide.

There are essentially two types of avalanches — loose snow (sluffs) and slab avalanches. Sluffs are not usually very dangerous in themselves. Their effects depend on the amount of snow set in motion. They may, however, trigger slab avalanches.

A snow slab is a cohesive mass of snow, covering a large area and acting as a unit. Slabs come in several varieties. Hard slab slides occur when big chunks of compressed snow break loose, capable of battering a hapless skier like boulders in a rock slide. Soft slabs release in smaller chunks and lose their character as they move down the slope. The snow is nearly mashed into powder. Wet slabs, which form in sunshine, flow down a hill almost like water.

The most spectacular avalanche — and the one disaster buffs like to show pictures of — is the airborne powder avalanche. These have been clocked moving down slopes at speeds of over 200 miles per hour and, unlike most avalanches, they have no respect for terrain features, thundering over ridges, rocks and whatever else happens to be in the way.

Avalanches have tremendous force behind them. As in the Washington state incident, they can sweep railroad trains off of their track. Even a small-to-moderate slide can uproot mature spruce and a large one can destroy

Avalanche rules of thumb

by Ron Perla

- Consider the general rule: NEVER TOUR AFTER A STORM. The question remains: How soon after the storm area conditions safe? One hour? One day? One month? A whole season?
- When conditions are unstable, the wise travel only for the rescue of fools.
- When it comes to judging slope stability, the rule of thumb is: There are no rules of thumb.
- A ski tour disaster is triggered by someone's intuition that a slope is stable.
- At an avalanche slope, ask not only "Will it slide?" but also, "What will happen if it does?"
- While crossing an avalanche slope, those who hesitate are lost.
- The family that tours close together gets buried close together.
- The weekend ski tour begins with a Friday night call to the snow ranger or ski patrol.
- Carry a probe as you would have others carry a probe for you.
- A fact, for what it's worth: No one wearing an avalanche cord has been recovered dead.

avalanches

by Dan Whittle

buildings — including reinforced concrete structures.

About 95 percent of all avalanches occur during or shortly after storm periods. The ones that trigger later than these are likely to be the larger and more destructive deep slab avalanches. And they are triggered without warning.

Stratton told a recent AAI class, "No two snowflakes and no two avalanches are ever identical, but they do have things in common. Avalanche paths develop the same general snowpack year after year. Fracture lines (the top and side boundaries of slides) are often in the exact same place and form the same pattern."

Most avalanches start on slopes of 30 to 45 degrees. On steeper slopes, snow tends to sluff off gradually and harmlessly, rather than forming slabs. On slopes of less than 30 degrees, gravitational force on the slab is not great enough to cause a slide. Usually, however, as avalanche expert Ron Perla said in his *Rules of Thumb*: "When it comes to judging slope stability, the rule of thumb is: There are no rules of thumb."

There is only one way to find out what conditions exist in the snowpack: Dig a hole to ground level and look. Different conditions exist in different areas, depending on weather, wind direction, amounts of sunlight and shade and other things. So, when a south-facing slope is safe, conditions could still be treacherous on the other side.

John Stratton works in Little Cottonwood Canyon near Alta, Utah. Though relatively small, it is a very active avalanche area. In 1884, 16 people were killed in Alta itself and the town nearly destroyed by an avalanche. The survivors took shelter in mine shafts.

Understanding snow physics and terrain analysis does not guarantee anything. Avalanches are notoriously unpredictable. Stratton tells this story on himself:

"I checked one of the slopes at Snowbird to determine whether it was safe enough to open for skiers. I dug a pit and tested the snow. It was solid. I thought, 'Yeah, this is great, we can open this one.'

"Just to be safe, I waited a day and my partner went to check it out. He came back in complete agreement with my assessment. We were going to open the slope the next day. That night, it avalanched."

So, what had happened? "I don't know. We both must have missed a very thin, weak layer."

The area around Alta and a number of other places in the Rockies are becoming increasingly developed, often at the run-out points of avalanche paths. Considerable work is going into determining to what extent land use patterns should be controlled because of the likelihood of avalanches and other natural hazards.

The University of Colorado's Ives said, "We have the problem of the 'climax

avalanche.' This is like a hundred year flood, an avalanche in a known path or a new path that is larger than anything we've ever experienced or that there is any history of. We cannot predict, for instance, if a major avalanche is going to come steaming down a hill and wipe out all the townhouses in Vail.

"One of the problems with the Rockies is that we have a relatively short written history of avalanches in the region. If you studied an area and recommended building site alternatives because there were major avalanches every 60 years, a developer would laugh at you."

One of the main tools for predicting avalanches for zoning and land use purposes is the frequency of avalanches along a certain path. Any traveler on highways in the Rockies can see and understand the visible, more frequent avalanche paths in the mountains. However, avalanches are erratic.

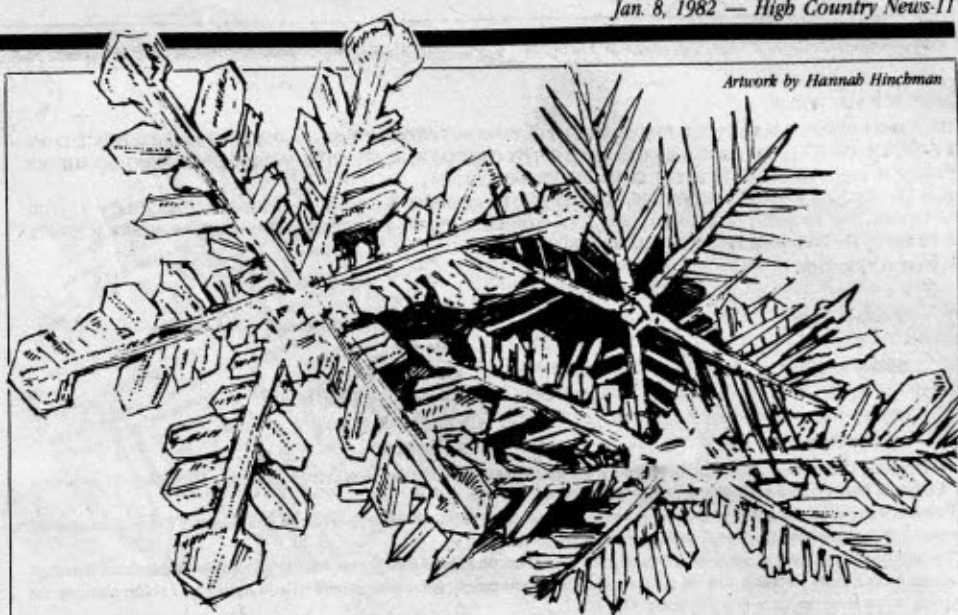
Ives said, "I saw a church in Europe that was over 1,100 years old that had been wiped out by an avalanche." It would be considerably understating the case to call such an occurrence "infrequent."

On the Simplon Pass in the Alps between Switzerland and Italy, there has been a monastery standing for centuries from which monks ventured forward to aid travelers. Napoleon built a road over the pass and described the monastery in his writings. Ives was there in 1974, shortly after it had been hit by an avalanche. He said, "All the furniture in the place was pushed out into the snow through the doors and windows. This was perhaps a 500-year recurrence."

Zoning for natural hazards is not simply a hypothetical problem in the Rockies. Development is occurring at a rapid rate in ski-oriented areas. Road construction requires careful consideration of avalanche patterns. The Trans-Canada highway crosses nearly 100 avalanche paths in the 91 miles between Golden and Revelstoke, B.C. Any frequent traveler over Teton Pass between Jackson, Wyo. and Victor, Idaho has stories to tell of the road being closed when Glory Bowl slid. One such slide bent steel girders being used to construct a bridge.

However, most victims of avalanches are skiers. According to avalanche expert Betsy Armstrong, "The (typical) victim is male, 27 years old, has had several years of skiing or mountaineering experience and doesn't know an avalanche from a snowball."

Most killer avalanches are triggered by the victim. And as AAI's Newcomb said, "Once you are caught in an avalanche, it's too late." Chances for survival decline dramatically with burial time. After burial of 30 minutes, only 50 percent of the victims survive. In terms of backcountry rescue, this means that a ski party must be prepared to dig out any victims itself. Organized rescue probably will be too far away to do any good.



Artwork by Hannah Hinchman

Snowflakes: a brief biography

People often say, "No two snowflakes are identical." I would like to know how they know. Certainly no one has ever seen them all. And, while the shapes that snow crystals can take may be infinite, the number of snowflakes that have fallen on the earth throughout history certainly approaches infinity. Therefore, statistically, it would seem to be possible that two snowflakes were identical, though perhaps separated by thousands of years and millions of snowstorms.

Beyond the observation of a snowflake's uniqueness, few people give much thought to them, except when enough of them fall to require snow tires. By this point, people have usually stopped wondering at their uniqueness and simply taken note of their overwhelming numerical superiority.

However, interest in weather modification has spurred scientific research into the formation of snow in the atmosphere. Some surprising discoveries have resulted, including a theory that snowflakes are visitors from outer space.

Most of the rain that falls on the earth begins as snow crystals that melt before they reach the ground. However, except for very cold high-altitude cirrus clouds, clouds consist primarily of tiny water droplets as dispersed as smoke. It is very puzzling that these droplets refuse to freeze, even though the cloud temperature may be many degrees below the nominal freezing point of water — zero degrees centigrade or 32 degrees Fahrenheit.

Scientists discovered that, depending on the volume of the droplets, water may be "supercooled" without freezing spontaneously at temperatures as low as about 40 degrees below zero F.

This led to the discovery that before this supercooled water can freeze, there has to be a tiny particle present serving as a nucleus for the crystal to form

around. Some scientists said that these nuclei came primarily from dust particles from the earth, carried aloft by the wind. However, E.G. Brown of Australia's Commonwealth Scientific and Industrial Research Organization analyzed world rainfall patterns and showed some correlation between rainfall and annual meteor showers, speculating that meteor dust was a large source of these nuclei — thus the "visitor from outer space" theory. However, subsequent investigation showed that earth-bound particles were indeed largely responsible for ice crystal formation.

In the course of examining the nuclei that cause ice crystal formation, B.J. Mason of London's Imperial College of Science and Technology found in laboratory research that some of the terrestrial dusts were more effective nuclei if they had previously been involved in ice crystal formation. They could be "trained" to form ice crystals more efficiently. For example, ice crystals grown in the atmosphere on kaolinite nuclei at 16 degrees F. later form on the same nuclei at temperatures as much as nine degrees higher.

The shape of snow crystals is determined largely by temperature. Though they are "almost infinite" in variety, scientists classify them in three basic forms: the hexagonal prismatic column, the hexagonal plate and the branching star-shaped form, sometimes called dendritic. The cycle of shapes is reproducible in a laboratory beginning with hexagonal plates and proceeding through the dendritic crystals as the temperature lowers.

The snow crystals that fall to the ground, however, are rarely perfect. They are battered and shaped by wind and rarely reach the bottom of their fall completely intact.

— DSW

Minimum equipment for backcountry skiers consists of avalanche cords for each skier, shovels and probes. The state of the art in victim location is the electronic rescue beacon, which sends a signal out through the snow and helps locate a buried skier. These are fairly expensive, however, and few skiers carry them.

Ski areas are now using specially trained avalanche dogs to find victims, but, because of the time required to get one to the scene none has yet made a live recovery.

The oil and gas boom in the Rockies has added another dimension to the avalanche business. Robby Fuller, another AAI instructor who worked in snow safety for 15 years at a Jackson Hole ski area, now sometimes works as a consultant to oil and gas companies that conduct drilling and seismic testing work in the winter.

He said, "When they first started putting drilling rigs into this steep terrain, they didn't think much about avalanche problems. I was first called in when one company put their drilling rig in the

middle of five slide paths. A helicopter landing near it set off an avalanche. The helicopter lifted off again and the avalanche slid under it. However, the company decided it would be cheaper to hire a snow safety consultant than lose a helicopter or a drilling rig in a slide. So they called me in."

Seismograph crews present unique problems in snow safety. They often work in remote, steep backcountry. The crews set lines that fire 50 pound explosive charges every 250 feet. The line must be straight and there is very little flexibility in moving the line to avoid an obvious avalanche path. In addition, the companies have done little or nothing to train crews about avalanche hazards.

Fuller said, "One crew tried to do its own snow safety. However, they have electric leads for their charges, so they couldn't throw them out onto the dangerous slopes. So one of their guys walked out on the slope, set down the charge and returned. When they set it off, the slope slid big. They were real proud of themselves." Fuller shrugged. "I told them, 'Well, you sort of did it right, but suppose you had been walking out there when it slid.' " □

STATE OF WYOMING PUBLIC NOTICE

PURPOSE OF PUBLIC NOTICE

THE PURPOSE OF THIS PUBLIC NOTICE IS TO STATE THE STATE OF WYOMING'S INTENTION TO ISSUE WASTEWATER DISCHARGE PERMITS UNDER THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972 (FWPCA), P.L. 92-500 AND THE WYOMING ENVIRONMENTAL QUALITY ACT (35-11-101 et seq., WYOMING STATUTES 1977, CUMULATIVE SUPPLEMENT 1973).

IT IS THE STATE OF WYOMING'S INTENTION TO ISSUE WASTEWATER DISCHARGE PERMITS TO (2) COMMERCIAL FACILITIES, AND (4) OIL TREATER FACILITIES, TO MODIFY (2) INDUSTRIAL PERMITS, (1) COMMERCIAL PERMIT, (1) OIL TREATER PERMIT, AND (2) MUNICIPAL PERMITS, AND TO RENEW (1) INDUSTRIAL PERMIT, AND (2) COMMERCIAL PERMITS.

APPLICANT INFORMATION

- (1) APPLICANT NAME: Properties Limited Corporation - South Park Mobile Home Park
MAILING ADDRESS: 425 South, 400 East
SALT LAKE CITY, UT 84111
FACILITY LOCATION: Uinta County, Wyoming
PERMIT NUMBER: WY-0030988

The Properties Limited Corporation plans to construct a new mobile home park near the City of Evanston, Wyoming. The facility will be known as the South Park Mobile Home Park and will contain 450 spaces.

Wastewater treatment will consist of an extended aeration package plant which will discharge to Yellow Creek (Class III Water) via an unnamed drainage. The discharge point is approximately 1/4 of a mile above Yellow Creek.

The proposed permit requires immediate compliance with effluent limitations based upon National Secondary Treatment Standards and Wyoming's In-stream Water Quality Standards. Periodic self-monitoring of effluent quality and quantity is required with reporting of results quarterly. The proposed permit is scheduled to expire December 31, 1986.

- (2) APPLICANT NAME: Mr. Stan Hollyman - Rocking H. Mobile Home Park
MAILING ADDRESS: P.O. Box 1270
Cody, Wyoming 82414
FACILITY LOCATION: Park County, Wyoming
PERMIT NUMBER: WY-0031020

The Rocky H. Mobile Home Park is a proposed development of 110 units located near the City of Cody, Wyoming. Proposed wastewater treatment will consist of an extended aeration package plant followed by a disinfection unit. The discharge will be to the Shoshone River (Class II Water) via an unnamed drainage.

The proposed permit requires immediate compliance with effluent limitations based upon National Secondary Treatment Standards and Wyoming's In-stream Water Quality Standards. Periodic self-monitoring of effluent quality and quantity is required with reporting of results monthly. The proposed permit is scheduled to expire January 31, 1987.

- (3) APPLICANT NAME: Agnew - Sullivan, Inc.
MAILING ADDRESS: P.O. Box 836
Cody, Wyoming 82414
FACILITY LOCATION: Freudenthal Lease, West Warm Springs Oilfield, Tank Battery #3, SE 1/4, Section 34, T43N, R94W, Hot Springs County, Wyoming
PERMIT NUMBER: WY-0030996

Facility is a typical oil treater located in Hot Springs County, Wyoming. The produced water is separated from the petroleum product through the use of heater treaters and skim ponds. The discharge is to Warm Springs Creek (Class IV Water) via an unnamed drainage.

The discharge must meet Wyoming's Produced Water Criteria effective immediately. Chapter VII of the Wyoming Water Quality Rules and Regulations infers that as long as the Produced Water Criteria is met, the water is suitable for beneficial use. There is no evidence to indicate that limitations more stringent than the Produced Water Criteria are needed to meet Wyoming's Water Quality Standards. The Department will continue to evaluate the discharge and, if necessary, will modify the permit if evidence indicates that more stringent limitations are needed.

Semi-annual self-monitoring is required for all parameters with the exception of oil and grease, which must be monitored quarterly. The proposed expiration date for the permit is December 31, 1984.

- (4) APPLICANT NAME: Atlantic Richfield Company
MAILING ADDRESS: P.O. Box 5540
Denver, Colorado 80217
FACILITY LOCATION: Ostlund Tank Battery, NW 1/4, Section 27, T51N, R73W, Campbell County, Wyoming
PERMIT NUMBER: WY-0031046

- (5) APPLICANT NAME: Husky Oil
MAILING ADDRESS: P.O. Box 380
Cody, Wyoming 82414
FACILITY LOCATION: Federal Tank Battery - Little Sand Draw, SE 1/4, Section 34, T45N, R96W, Hot Springs County, Wyoming
PERMIT NUMBER: WY-0031038

Facilities are typical oil treaters located in Campbell and Hot Springs Counties, Wyoming. The produced water is separated from the petroleum product through the use of heater treaters and skim ponds. The discharges are to Lone Tree and Sand Draw (Class IV Waters) via unnamed drainages.

The discharges must meet Wyoming's Produced Water Criteria effective immediately. Chapter VII of the Wyoming Water Quality Rules and Regulations infers that as long as the Produced Water Criteria is met, the water is suitable for beneficial use. There is no evidence to indicate that limitations more stringent than the Produced Water Criteria are needed to meet Wyoming's Water Quality Standards. The Department will continue to evaluate the discharges and, if necessary, will modify the permits if evidence indicates that more stringent limitations are needed.

Semi-annual self-monitoring is required for all parameters with the exception of oil and grease, which must be monitored quarterly. The proposed expiration date for the permits is December 31, 1984 for the Atlantic Richfield Facility and December 31, 1986 for the Husky Facility.

- (6) APPLICANT NAME: Husky Oil Company
MAILING ADDRESS: P.O. Box 380
Cody, Wyoming 82414
FACILITY LOCATION: Zimmerman Butte Federal Tank Battery, SE 1/4, Section 35, T44N, R95W, Hot Springs County, Wyoming
PERMIT NUMBER: WY-0031003

Facility is a typical oil treater located in Hot Springs County, Wyoming. The produced water is separated from the petroleum product through the use of heater treaters and skim ponds. The discharge is to Kirby Creek (Class IV Water) via an unnamed drainage.

The discharge must meet Wyoming's Produced Water Criteria effective immediately. Chapter VII of the Wyoming Water Quality Rules and Regulations infers that as long as the Produced Water Criteria is met, the water is suitable for beneficial use. There is no evidence to indicate that limitations more stringent than the Produced Water Criteria are needed to meet Wyoming's Water Quality Standards. The Department will continue to evaluate the discharge and, if necessary, will modify the permit if evidence indicates that more stringent limitations are needed.

Semi-annual self-monitoring is required for all parameters with the exception of oil and grease, which must be monitored quarterly. The proposed expiration date for the permit is December 31, 1986.

- (7) APPLICANT NAME: Bridger Coal Company
MAILING ADDRESS: % Nerco
111 S. W. Columbia, Suite 800
Portland, OR 97201
FACILITY LOCATION: Sweetwater County, Wyoming
PERMIT NUMBER: WY-0030350

The Bridger Coal Company operates a large open pit coal mine east of Rock Springs, Wyoming which provides fuel to the Jim Bridger Power Plant. The company is requesting that its existing discharge permit be modified to reflect changes in locations of 5 of the mine's 10 different discharge points. The referenced discharges flow into Deadman Wash, Ninemile Wash and Nine and One Half Mile Wash which are all Class IV Waters. The discharges must meet effluent limitations which are considered by the State of Wyoming to represent "best available treatment." However, the

permit also contains a "re-opener clause" which requires the permit to be modified should more stringent limitations be developed at the federal level.

Runoff from disturbed areas will be controlled by sedimentation ponds which are designed to completely contain the runoff resulting from a ten year - 24 hour precipitation event. Because these ponds will not normally discharge, they are not specifically identified in the permit but are covered by operation and maintenance provisions.

Periodic self-monitoring of effluent quality and quantity is required with reporting of results quarterly. The permit is scheduled to expire January 31, 1987.

- (8) APPLICANT NAME: Medicine Bow Coal Company
MAILING ADDRESS: P.O. Box 490
Hanna, Wyoming 82327
FACILITY LOCATION: Carbon County, Wyoming
PERMIT NUMBER: WY-0023604

The Medicine Bow Coal Company operates a large open-pit coal mine located west of the town of Hanna, Carbon County, Wyoming. The company currently has a discharge permit to discharge at three separate locations. The company has now requested that the permit be modified to allow a fourth point of discharge.

The referenced discharges flow into Big Ditch and Pix Draw which are both Class IV Waters.

The discharges must meet effluent limitations which are considered by the State of Wyoming to represent "best available treatment." However, the permit also contains a "re-opener clause" which requires the permit to be modified should more stringent limitations be developed at the federal level.

Runoff from disturbed areas will be controlled by sedimentation ponds which are designed to completely contain the runoff resulting from a ten year - 24 hour precipitation event. Because these ponds will not normally discharge, they are not specifically identified in the permit but are covered by operation and maintenance provisions.

Periodic self-monitoring of effluent quality and quantity is required with reporting of results quarterly. The permit is scheduled to expire January 31, 1987.

- (9) APPLICANT NAME: The Wyoming Girl Scout Council
MAILING ADDRESS: Camp Sacajawea
P.O. Box 293
Casper, Wyoming 82602
FACILITY LOCATION: Approximately ten miles south of the City of Casper, on the south side of Casper Mountain, Natrona County, Wyoming
PERMIT NUMBER: WY-0030422

The Wyoming Girl Scout Council has opened a lodge on the south slope of Casper mountain which will be known as Camp Sacajawea. The wastewater treatment facilities serving the camp will consist of an extended aeration package plant which will discharge into Red Creek (Class IV Water) via an unnamed drainage.

The proposed permit requires immediate compliance with National Secondary Treatment Standards and Wyoming's In-stream Water Quality Standards. Effluent quality and quantity must be monitored on a regular basis with reporting of results quarterly. The permit is scheduled to expire December 31, 1986.

The Wyoming Girl Scout Council has requested that the sampling frequency in their present permit be relaxed. Due to the sporadic use of the facility and the non-profit nature of this organization the requested changes have been incorporated into this proposed permit.

- (10) APPLICANT NAME: Beren Corporation
MAILING ADDRESS: 2160 First of Denver Plaza
633 - 17th Street
Denver, Colorado 80202
FACILITY LOCATION: Irvine Brothers Fee Lease, NW 1/4, SE 1/4, Section 8, T37N, R84W, Natrona County, Wyoming
PERMIT NUMBER: WY-0028321

Facility is a typical oil treater located in Natrona County, Wyoming. The produced water is separated from the petroleum product through the use of heater treaters and skim ponds. The discharge is to Okie Draw (Class IV Water) via an unnamed drainage.

The discharge must meet Wyoming's Produced Water Criteria effective immediately. Chapter VII of the Wyoming Water Quality Rules and Regulations infers that as long as the Produced Water Criteria is met, the water is suitable for beneficial use. There is no evidence to indicate that limitations more stringent than the Produced Water Criteria are needed to meet Wyoming's Water Quality Standards. The Department will continue to evaluate the discharge and, if necessary, will modify the permit if evidence indicates that more stringent limitations are needed.

The permit is being modified so that the expiration date will conform with all other oil treater facilities in the same geographic area. Semi-annual self-monitoring is required for all parameters with the exception of oil and grease, which must be monitored quarterly. The proposed expiration date for the permit is December 31, 1982.

- (11) APPLICANT NAME: Town of Bairoil
MAILING ADDRESS: P.O. Box 58
Bairoil, Wyoming 82322
FACILITY LOCATION: Sweetwater County, Wyoming
PERMIT NUMBER: WY-0021075

The Town of Bairoil has recently requested a permit modification which requires quarterly monitoring of the lagoon effluent. This permit contains monitoring frequencies which reflect this request.

The proposed permit requires immediate compliance with effluent limitations based on National Secondary Treatment Standards and Wyoming's In-stream Water Quality Standards. Effluent quality and quantity must be monitored on a regular basis with reporting of results quarterly. The permit is proposed to expire January 31, 1987.

- (12) APPLICANT NAME: Fort Bridger Sewer District
MAILING ADDRESS: P.O. Box 2
Fort Bridger, Wyoming 82933
FACILITY LOCATION: Uinta County, Wyoming
PERMIT NUMBER: WY-0022071

The wastewater treatment facility serving the Fort Bridger Sewer District is a newly constructed two cell aerated lagoon with chlorination. The lagoon discharges to the Blacks Fork River (Class II Water) via an unnamed drainage. The point of discharge is approximately 1/2 mile above the Blacks Fork River.

A major upgrading of the treatment system has just been completed and as a result the permit is being proposed for modification. The modified permit will require immediate compliance with effluent limitations based upon National Secondary Treatment Standards and Wyoming's In-stream Water Quality Standards. Periodic self-monitoring of effluent quality and quantity is required with reporting of results quarterly. The proposed permit is scheduled to expire December 31, 1986.

- (13) APPLICANT NAME: E.H. Walrath and Sons
MAILING ADDRESS: P.O. Box 597
Powell, Wyoming 82435
FACILITY LOCATION: Park County, Wyoming
PERMIT NUMBER: WY-0026654

E.H. Walrath and Sons operate a grain and feed store in Powell, Wyoming. Boiler feed water is softened before use with a conventional water softener. The water softener automatically recycles once per day and discharges 10 - 15 gallons to the Garland Canal.

While the effluent is highly mineralized, the quantity of discharge is so small that it has no effect on the Garland Canal (Class II Stream) which is one of the major canals serving the Shoshone Irrigation District.

The discharge permit allows the present practice to continue and establishes no effluent or self-monitoring requirements. The permit will expire February 28, 1987.

- (14) APPLICANT NAME: B and R, Inc.
MAILING ADDRESS: 908 Wyoming Street
Rock Springs, Wyoming 82901
FACILITY LOCATION: Sweetwater County, Wyoming
PERMIT NUMBER: WY-0022128

The wastewater treatment facilities serving the B. and R. Trailer Court in the Town of Reliance, Wyoming consist of an extended aeration package plant, a chlorinator and a polishing pond. The discharge is to Killpecker Creek (Class IV Water).

The proposed permit requires immediate compliance with effluent limitations based upon National Secondary Treatment Standards and Wyoming's In-stream Water Quality Standards. Periodic self-monitoring of effluent quality and quantity is required with reporting of results quarterly. The proposed permit is scheduled to expire March 31, 1987.

- (15) APPLICANT NAME: Silver Dollar Motel, Inc. - Quality Inn of Rock Springs
MAILING ADDRESS: 1635 N. Elk Street
Rock Springs, Wyoming 82901
FACILITY LOCATION: Sweetwater County, Wyoming
PERMIT NUMBER: WY-0026671

The Quality Inn of Rock Springs (previously the Silver Dollar Motel) is a 100 unit motel located on the north side of Rock Springs, Wyoming. Wastewater treatment serving the motel is an extended aeration package plant followed by a chlorinator. The plant discharges to Killpecker Creek (Class IV Water).

The proposed permit requires immediate compliance with effluent limitations based upon National Secondary Treatment Standards and Wyoming's In-stream Water Quality Standards. Periodic self-monitoring of effluent quality and quantity is required with reporting of results quarterly. The proposed permit is scheduled to expire February 28, 1987.

STATE/EPA TENTATIVE DETERMINATIONS

Tentative determinations have been made by the State of Wyoming in cooperation with the EPA staff relative to effluent limitations and conditions to be imposed on standards and applicable provisions of the FWPCA will be protected.

PUBLIC COMMENTS

Public comments are invited any time prior to February 8, 1982. Comments may be directed to the Wyoming Department of Environmental Quality, Water Quality Division, Permits Section, 1111 East Lincolnway, Cheyenne, Wyoming 82002, or the U.S. Environmental Protection Agency, Region VIII, Enforcement Division, Permits Administration and Compliance Branch, 1860 Lincoln Street, Denver, Colorado 80925. All comments received prior to February 8, 1982 will be considered in the formulation of final determinations to be imposed on the permits.

ADDITIONAL INFORMATION

Additional information may be obtained upon request by calling the State of Wyoming, (307) 777-7781, or EPA, (303) 327-3874, or by writing to the aforementioned addresses.

The complete applications, draft permits and related documents are available for review and reproduction at the aforementioned addresses.

Public Notice No. WY-81-001

BEFORE THE WYOMING INDUSTRIAL SITING COUNCIL

IN THE MATTER OF:)
ROCHELLE COAL COMPANY)
the)
APPLICANT) DOCKET NO. WISA-81-3
PERMIT APPLICATION TO CONSTRUCT)
THE ROCHELLE MINE, CAMPBELL)
COUNTY, WYOMING)

NOTICE OF PUBLIC HEARING

Pursuant to Wyoming Statute 35-12-109 and Wyoming Statute 9-4-107(b) of the Wyoming Administrative Procedure Act, NOTICE IS HEREBY GIVEN THAT THE WYOMING INDUSTRIAL SITING COUNCIL WILL CONDUCT A PUBLIC HEARING ON THE ROCHELLE COAL COMPANY APPLICATION FOR AN INDUSTRIAL SITING PERMIT TO CONSTRUCT THE ROCHELLE MINE IN CAMPBELL COUNTY, WYOMING. The Council will convene at 9:00 a.m., Thursday, February 4, 1982, in the Balboa Room of the Holiday Inn in Gillette, Wyoming. The Council will consider the application pursuant to the provisions of the Wyoming Industrial Development Information and Siting Act (Wyoming Statute 35-12-101 to 35-12-121), and Rules and Regulations adopted thereunder.

The Council and its presiding officer will conduct the hearing in accordance with Sections 13-15 of the Rules of Practice and Procedure of the Industrial Siting Council. The presiding officer will conduct the hearing and will make a procedural ruling.

Persons desiring to make a limited appearance statement shall do so in writing as provided by Wyoming Statute 35-12-112(c). Limited appearance statements will be received in the Office of Industrial Siting Administration, Cheyenne, not later than February 9, 1982, or may be submitted to the presiding officer at the hearing.

Dated this 29th day of December, 1981.

Office of Industrial Siting Administration
500 Boyd Building
Cheyenne, WY 82002
(307) 777-7368

BULLETIN BOARD

CONTRIBUTE TO AN EIS

Those interested in participating in the development of a draft environmental impact statement on oil and gas leasing applications in wilderness, proposed wilderness and wilderness study areas in Montana and North Dakota must have written comments to the Forest Service at the address below by Jan. 22. The Forest Service seeks written comments and suggestions on issues involved with oil and gas leasing in some 31 areas to be covered by the EIS, which should be published in the spring. Send comments to Northern Region Forester, Attn: Bruce Pewitt, Oil-Gas Leasing DEIS, P.O. Box 7669, Missoula, Mont. 59807 or phone (406) 329-3516.

INDIAN STUDIES PROGRAM

The American Indian Studies Center, UCLA, is beginning a project to improve graduate level education for American Indian students through the development of a M.A. degree program in American Studies. Curricula and degree requirements will be based on a study assessing the gaps between present educational offerings and future needs. Contact project directors Charlotte Heth or Susan Guyette at the American Indian Studies Center, UCLA (231) 825-7315 for further information.

POWDER RIVER COAL EIS

The Interior Department has released a final environmental impact statement that examines the possible impacts of federal coal leasing and development in a four-county area of the Powder River Coal Region in Wyoming and Montana. Four levels of leasing are considered in the EIS. The preferred alternative involves 14 federal coal tracts which would yield 1.5 billion tons when in full production. A leasing decision by the secretary of interior is expected in Feb. Copies of the EIS are available from the Bureau of Land Management District Office, 951 Rancho Road, Casper, Wyo. 82601; the BLM Wyoming State Office, 2515 Warren Avenue, Cheyenne, Wyo. 82001; the Miles City BLM District Office, P.O. Box 940, Miles City, Mont. 59301; and the BLM Office of Public Affairs, 18th and C Streets, N.W., Washington, D.C.

EXTENDING COAL LEASES

Some coal companies would be allowed relaxed development requirements for leases on federal lands if rules proposed by the Department of Energy take effect. Currently, companies issued leases prior to August 4, 1976 are required to bring land into commercial production by June 1, 1986 or face lease termination. The new regulations extend the deadline for up to ten years after the lease is first eligible for renewal, giving most lessees until the 1990s or longer to achieve commercial coal production. The DOE invites interested people to submit written comments by Feb. 20 to the Office of Public Hearings Management, Economic Regulatory Administration, Box YB (Docket No. LPD 81-2), 2000 M St. N.W., Washington, D.C. 20461. A public hearing will be held at the Post Office Auditorium, Rm. 269, 1823 Stout St., Denver, Colo., on Feb. 17, 1982. Speakers at the hearing must file a request with DOE at the above Office of Public Hearings Management address by Feb. 10.

MONEY FOR NUCLEAR SCIENCE

Graduate study in the nuclear field has just become more lucrative with the establishment of a new fellowship program by the Department of Energy. The fellowships, in nuclear science and engineering, and health physics, will award an annual stipend of \$12,000 to each student, as well as \$6000 tuition and fee reimbursement to the participating university. Interested students and universities should contact Mr. Al Wohlpart, Oak Ridge Associated Universities, University Programs Office, P.O. Box 117, Oak Ridge, Tenn. 37830 or phone (615) 576-3428.

NORTHERN REGION PLAN

The U.S. Forest Service's Northern Region Plan, final environmental impact statement and record of decision outlining the management direction and concerns, and public issues is available for review. The plan covers national forests, national grasslands and forest research laboratories in Montana, northern Idaho, eastern Washington and the Dakotas. For your copy, contact the Northern Region Headquarters, U.S.F.S., P.O. Box 7669, Missoula, Mont. 59807.

FUTURE WILDLIFE MANAGEMENT

Wyoming residents: this is your chance to hear and discuss wildlife management objectives for Wyoming. The Wyoming Game and Fish Department is holding a series of public meetings to acquaint people with the department's strategic plan for fish and wildlife management in future years. The meetings, which will begin at 7:00 p.m., will be held at these locations: Jan. 13, Rock Springs, Western Wyoming Community College; Jan. 14, Laramie, Game & Fish District Office; Jan. 18, Lander, Game & Fish District Office; Jan. 19, Jackson, Wildlife Taxidermy Studio; Jan. 20, Cody, Game & Fish District Office.

AGRICULTURAL LAND USE

How much farmland is being converted to non-farm uses? Does the loss of farmland threaten the ability of the U.S. to meet domestic and world needs for food and fiber? What are local, state and federal governments doing about current trends in agricultural land use? These questions are examined in *Farmland, Food and the Future*, a new book available from the Soil Conservation Society of America, 7515 N.E. Ankeny Road, Ankeny, Iowa 50021. According to the SCSA, the book looks at the competition for land and presents the statistics and trends in land use; as well as discussing key issues. All of this in 214 pages for \$8.00 prepaid, from the SCSA at the above address.

TETON WINTER ACTIVITIES

The National Park Service is offering ranger-led winter activities for outdoor-oriented visitors to Grand Teton National Park in Wyoming. A two-hour snowshoe hike will be offered every Sunday and Wednesday, and an afternoon ranger-led ski tour will be held every Saturday in January. Reservations are required for both events. Call (307) 733-2880, ext. 253, for reservations and information. The Moose Visitor Center will be open from 8 a.m. to 4:30 p.m. daily throughout the winter season.



MINING LOOPHOLE CLOSED

The Office of Surface Mining has proposed changes in the Surface Mining Control and Reclamation Act of 1977 to close a loophole which allowed abuse of the two-acre exemption. This provision exempted coal operations which affect two acres or less from complying with the requirements of the Act. Proposed changes define the affected area, and clarify how it is computed, as well as setting up a system for ruling which operations are exempt. The OSM is accepting written comments on the proposals until 5:00 p.m. Feb. 12. Send comments to: Office of Surface Mining, U.S. Department of the Interior, Administrative Record Office, Room 153, South Building, 1951 Constitution Ave., N.W., Washington, D.C. 20240.

IMPROVE MEDIA RELATIONS

Conservationists interested in working more effectively with the print and broadcast media can get help from a free new handbook by the Sierra Club. Topics include news conferences, public service announcements, getting on radio and television and column topics. Write to Media Handbook, Public Affairs, Sierra Club, 530 Bush Street, San Francisco, Calif. 94108.

LEASE A CAMPGROUND

Are you interested in operating a National Forest recreational facility next summer? If so, you can be part of an experimental program by the Forest Service to lease recreational facilities such as campgrounds to private operators in order to save money on operation and maintenance. Two facilities in the Northern Region, one in Idaho and one in Montana, will be offered for lease through competitive bidding. Interested parties should contact Recreation and Lands, USDA Forest Service, Northern Region Headquarters, P.O. Box 7669, Missoula, Mont. 59807 during January.

SONORAN DESERT STUDIES

The Tucson Audubon Society will hold its 12th annual Institute of Desert Ecology from April 30 to May 2, 1982 in the foothills of the Tucson Mountains, Ariz. The three-day session on Sonoran desert ecology will emphasize plant-animal-environment relationships and interactions. Tuition for the session is \$157, including food and lodging. One unit of college credit may be arranged for the session. Contact June Hirsch, Director, Institute of Desert Ecology, 30-A N. Tucson Blvd., Tucson, Ariz. 85716 for registration information.

REFORMED REGULATIONS WEAKEN AUDITS

"Regulatory reform" may take the Conservation out of the Residential Conservation Service (RCS) program administered by the Department of Energy if proposed amendments are adopted. The RCS program, established by the National Energy Conservation Policy Act of 1978, requires large natural gas and electric utilities to perform energy audits of their customers' homes on request; provide general information on optional conservation measures and installment costs; and provide lists of approved contractors. Proposed amendments would abdicate responsibility for implementing RCS, shifting much of the administrative responsibilities to the states; promote only those conservation measures with a certain payback period and eliminate the requirement that audit results be delivered in-person, on-site by the inspector; eliminate or weaken such consumer protection provisions as minimum health and safety guidelines for materials and installation, give utilities more control over the lists of eligible contractors, and abolish public participation requirements. Written comments addressed to Office of Conservation & Renewable Energy, Office of Hearings and Dockets, Mail Station 6B-025, Department of Energy, 1000 Independence Ave., S.W., Washington, D.C. 20585 will be accepted until Jan. 20, 1982.

TREK FOR BREATH

If you are a skilled outdoor group leader and are familiar with the Yellowstone National Park and Shoshone National Forest backcountry, this opportunity may be for you. The American Lung Association of Montana seeks trail leaders for their August 1982 TREK — an adult fund raiser — through the Thorofare area of Yellowstone and the Eagle Creek area of the Washakie Wilderness. They offer a free trip, food included, for volunteer leaders of the six day trip. Contact Anna B. Jones, Program Consultant, American Lung Association of Montana, 825 Helena Ave., Helena, Mont. 59601 or phone (406) 442-6556.

FASTER COAL LEASING

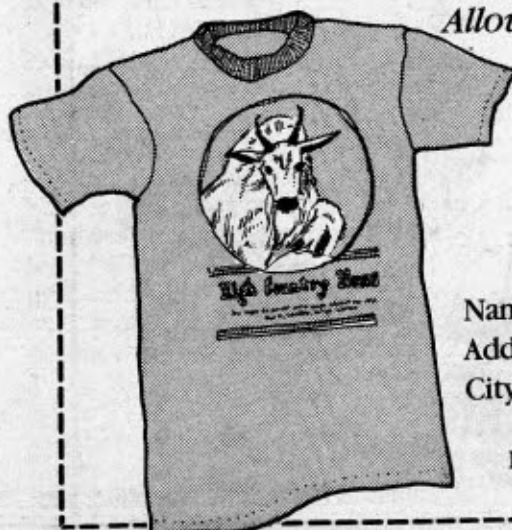
The Bureau of Land Management and the U.S. Geological Survey seek public comment on proposed new coal leasing rules published in the December 16, *Federal Register*. The proposed changes, are designed to ultimately accelerate the offering of publicly-owned coal lands for leasing, according to Interior Secretary James Watt. BLM proposes to change the solicitation of information during the planning process, eliminate the current procedures for setting coal leasing goals and targets, and revise the unsuitability criteria. The USGS proposed new rules reinterpret requirements for submission of detailed "operation and reclamation plans" by lease operators. Current requirements that such plans be submitted within three years of lease issuance would be eliminated. Interested public are urged to attend information meetings at 2:00 p.m. and 7:00 p.m. at these locations: the Ramada Inn, Casper, Wyo. on Jan. 13; and the Farmington Civic Center, Room C, 200 West Arrington, Farmington, N.M. on Jan. 15. Comment on the proposed rules is due Feb. 16, and should be sent to Director (140), BLM, 18th and C Streets, N.W., Washington, D.C. 20240, or to Director (MS 653), USGS, National Center, Reston, Virginia 22092.

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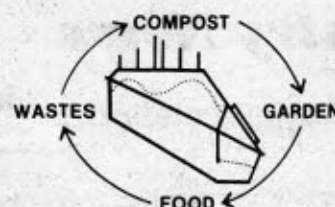
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OPINION

Uranium's decline

Open pit and economic pendulum

In a bar in Lander, Wyoming early this past Christmas Eve, a recently laid-off uranium mine worker was lamenting to a buddy, "If it wasn't for that damned Jane Fonda, we'd still be working out there at Gas Hills. If it wasn't for her, they'd be building more nuclear plants and they'd be buying more uranium."

Actress Jane Fonda is certainly one of the more visible critics of the domestic nuclear power industry, but even the staunchest industry defender could probably stop short of putting the industry's current woes entirely upon her shoulders. A woman who played Barbarella scarcely seems capable of bringing a multibillion dollar industry to its knees.

The problems of "nuclear" power go considerably deeper than popular protests. And these problems have a direct impact on the economy in the West, where nearly all of the uranium for nuclear power plants is produced. About 8,000 of the 22,000 workers in the uranium industry have been laid off since 1979.

The main problems with nuclear power are economic. Long before now, long before the accident at Three Mile Island, the industry was in trouble. The companies that actually use nuclear power — electric utilities — have not ordered a new nuclear power plant since 1974, and they have cancelled orders for several others. *Business Week* magazine, hardly a mouthpiece for the Jane Fondas of the world, published a cover story on the industry's troubles in 1976, citing the cost escalations and engineering problems associated with nuclear plants.

According to Charles Komanoff, a nuclear power consultant and author of *Power Plant Cost Escalation*, these problems are going to get worse. In real terms, he said, nuclear capital costs increased 142 percent between 1971 and 1978, twice as fast as coal's. In addition, the capital costs will probably continue to increase in the 1980s at about the same rate as they did in the 1970s, primarily to pay for safety improvements.

Komanoff is a controversial figure in the industry and not known particularly as a friend of nuclear power. However, utility executives are no more bullish. As one told Don Snow (*HCN*, 12/11/81), "A nuclear plant today will take at least 13 years to build, while coal plants can come on line four to five years quicker. That advantage alone makes coal the preferred technology."

All of this has obvious repercussions on the domestic uranium industry. No nuclear power plants, no need for fuel to fire them. Once again the experts are not sanguine about the prospects. NUEXCO, a California-based uranium broker, predicts that yellowcake prices, at their lowest in years, will remain stable through the 80s. In addition, the company says that, short of import restrictions, most new demand will be met by high-grade, low-cost foreign supplies. And according to an article in *Technology Review* quoted in Snow's article, two other experts predict that uranium oversupply will drive the price down further during the 80s unless there is a massive revitalization of the world nuclear industry.

The alert reader will note that none of these serious problems faced by the industry are preceded by the word "environmental." No one in a position to know is arguing that environmental restrictions on uranium are a major factor in the industry's decline.

Nevertheless, what do the western boosters of the fuel jump on first when looking at ways to bail out the crippled industry? Right. Environmental problems.

There is currently a push in Wyoming and New Mexico to allow uranium mines that have "suspended" operations to postpone reclamation of their mines. The argument goes: "Why reclaim the mines and push all that dirt back in when they are just going to have to take it out again when they re-open?"

A Wyoming blue ribbon committee, headed by Riverton newspaper publisher and State Sen. Roy Peck, is proposing just that. He told Snow the companies have posted bonds to reclaim the land, so they will do it.

There are, as we have seen, a number of reasons to reclaim now. The most obvious one is the uncertainty about whether they will ever open again, much less in the three to five years that Peck's committee is projecting.

The bonding issue is a tricky one. True, the companies have put up bonds. However, in today's inflationary climate, the cost of reclamation goes continually up and the real value of a fixed-figure bond goes down. There comes a point at which a rational company will make the decision to forfeit the bond because it is cheaper than reclaiming the land.

There is also a simpler reason — the companies agreed to reclaim when they began to do business in their respective states. Now the market has gone bad and they face the prospect of closing down and losing money. Tough. That is what used to be known as the free market. American industry, and particularly the mining industry has a great penchant for waving the free enterprise flag when they are stuffing their pockets with green, and crying to the government for variances and bailouts when the market turns against them. Uranium and nuclear power have apparently lost the struggle in the energy market. *Requiescat in pace.*

Nevertheless, there is a problem here. A large number of people have been thrown out of work through no fault of their own and the economies of a number of small, essentially one-industry towns have been badly damaged.

We would like to urge Peck and cohorts to give the uranium industry a decent burial and take a progressive look at the future of their states' economies instead of their past. All this effort to leave a few unreclaimed holes in the ground could be expended to attract new industries to the distressed communities and establish new jobs, diversified economies and a freedom, at long last, from the mercurial boom and bust cycle of the mining industry.

New Mexico and Wyoming have been collecting severance taxes on minerals for years to "provide for future generations." Let them start providing now. The money is there. The blue ribbon committees could look at some innovative methods of attracting new jobs instead of trying to dodge reclamation laws.

This is not the last time the states in the Rockies are going to face these kinds of pressures. Sooner or later — though probably later — the coal, oil and natural gas booms are going to slow and die as well. Given the lack of progressive thought solving current problems, one can take little solace in contemplating how political leaders are going to handle future ones.

— DSW

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LETTERS

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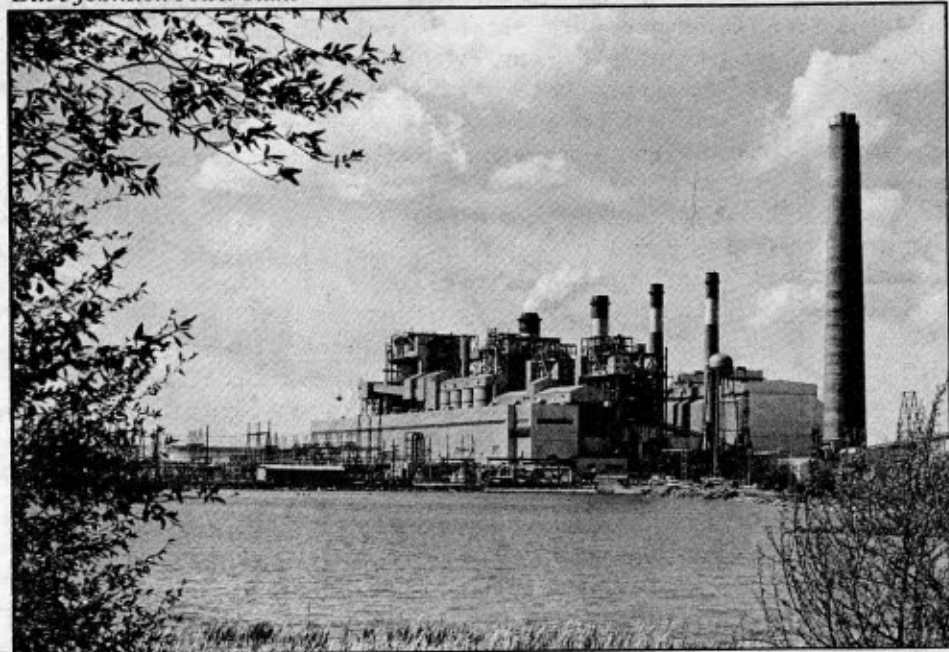
Dear HCN,

Enclosed you will find for your files an updated picture of the Dave Johnston Power Plant located near Glenrock (Wyo.) which more closely depicts how the plant looks when in operation than the photo you chose to run in *High Country News* (10/30/81).

You and your readers may be interested to know that Pacific Power & Light Company installed electrostatic precipitators on the first three generating units at a cost of over \$50 million to remove more than 99 percent of the fly ash from the furnace gas. Unit No. 4 is equipped with a wet scrubber system designed also to remove in excess of 99 percent of the fly ash from flue gas. The wet scrubber has been in operation since 1972 and the electrostatic precipitators have been operational since 1976.

In the interest of fairness, I'm sure you

Dave Johnston Power Plant



will run the updated photo in the next issue of HCN.

Bob Tarantola
Pacific Power & Light Co.
Casper, Wyoming

INCENSED

Dear HCN,

I am incensed by the letter to the editor from Richard Prosapio of El Paso, Texas which you titled "Deeper Snow," (HCN, 11/13/81). He evaluates the column "Afield" by Don Snow (HCN, 9/18/81) as "beautifully formed prose" and calls any reader "concrete" who "could not appreciate the metaphors in Snow's piece." I resent Prosapio's remarks regarding my attitude. Please note that neither he nor Snow has seen fit to offer any explanations of the so-called metaphors of which he says I am unappreciative.

If the column in question is "beautifully formed prose" it follows, logically, that contrasting forms must be ugly — works always considered of classic quality. For example, *Walden Pond* — Thoreau never mentioned whores. Let's throw it out! Toss Aldo Leopold's *Sand County Almanac* after it. Follow with Edward Abbey's *Desert Solitaire*, Mar-

garet Murie's far north experiences, *Special Edition of Tom Bell's High Country News... 1969-1975* and *Audubon Magazine*, all notably lacking in references to drunkenness, kicking of asses; no designating of fathers and others as "yahoos;" no taking of the Lord's name in vain.

I am disappointed and unhappy with HCN and its editors for accepting "Afield" by Don Snow.

I have supported HCN over much of its existence with tremendous amounts of donated time and effort. I have recommended it at every opportunity.

However, if editorial choices continue in such blatant disregard of good taste I shall withdraw any further reinforcement of the environmental movement through this medium. To do otherwise would compromise principles in which I believe.

If this attitude shows that I am "concrete" as Mr. Prosapio indicates, so be it.

Myra Connell
Lander, Wyoming

BOOKS

BEYOND THE ASPEN GROVE
ANN ZWINGER

Harper Colophon Books, 1981. \$6.95, paperback, 345 pages.

Review by Joan Nice

The aspen grove is the center. It's where Ann Zwinger and her family built a small cabin, so they could enjoy their 40 acres of the Colorado Rockies in foul as well as fair weather.

From there, Zwinger begins her explorations of the lakes, forests, streams and meadows of her mountain home. Forty acres is small by most Western standards, but under Zwinger's scrutiny it becomes a rich storehouse of ecological learning. While some "nature lovers" stride through the Rockies as if they were working out in a gymnasium, Zwinger ambles, crawls, sits, watches and sketches until she knows every inch of her 40 acre tract.

For its size and readable style, the book is surprisingly comprehensive. It indulges Zwinger's penchant for the inconspicuous — the plants and animals that best reveal themselves under a

hand lens or microscope. As a result the reader may see liverworts, leeches, lichens and mosses more clearly than ever before.

Zwinger is also full of intriguing book-learning. As she describes a pair of ducks on her lake, she explains that mallards' tongues are grooved and serrated so they can strain their food out of the mud.

On a walk through her upper meadow we learn that some mountain perennials can use dissolved nutrients like antifreeze to protect themselves from inhospitable temperatures.

Later in the walk, the rattling sound of a grasshopper reminds her of another bit of lore: On cold mornings grasshoppers sit with their bodies at right angles to the sun; on a hot afternoon they sit lengthwise.

Zwinger's well-trained eye was nurtured in the field of fine arts. To this woman with degrees in art history from Wellesley and Indiana University, "The mertensia is as feminine as a Botticelli painting; the honeysuckle is as rugged as a Remington portrait of the West, reflecting the beauty of a pioneer spirit."

Along with these artist's analogies, Zwinger weaves scientific precision and homespun simplicity. A tick is "a small gray watermelon-seed of a creature." Ponderosa pines stand with "their lower branches just touching, spaced as carefully as children in dancing school." "Conifers have a majestic monotony, like someone who is always right....But aspen has eclat...."

This paperback edition of a hard-bound volume published 11 years ago contains the same fine Zwinger drawings and text as the original, with only a 16-page appendix missing. It will fit neatly into a backpack — a good place for this intimate picture of life at 8,300 feet.

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Sleeping it off: animals in hibernation

by Carol Jones

Bears have mastered living comfortably, while conserving energy, through the winter. For three to seven months, they take long sleeps and short naps, waking up occasionally to stretch, move about or defend themselves. They never have to eat, drink, urinate or defecate. Females even give birth during this satisfying lethargic state.

Hibernation is a physiological reaction some mammals experience in response to the difficulty of existing in winter. Of the mammals that do hibernate, not all go through the same phases or processes. For example, if you came across a hibernating ground squirrel, you could pick it up and flop it around and it probably wouldn't wake up. But if you came across a peacefully sleeping bear in the winter, it wouldn't be wise to punch him — you're likely to get punched back.

"Hibernation is a bad term to use because it is used in such a general sense to describe many different responses," said Bruce Wunder, associate professor of zoology at Colorado State University. "What bears and chipmunks do are very different."

Wunder suggests using the term "torpidity" to describe what happens to these mammals in the winter. If an animal is experiencing true hibernation, it must display three characteristics of torpidity: a drop in body temperature, reduced metabolic rate and reduced heart and breathing rates.

Wunder said there is no average for these changes. "It depends on the body size," he said. "The normal heart rate for a squirrel is 150 to 300 beats per minute — it drops to about 5 bpm during hibernation. But it changes from animal to animal. One animal may take 10 quick breaths and then not breathe again for two minutes — for another, it's different."

In addition to the torpid characteristics, most hibernators also fast.

According to G. Edgar Folk Jr. of the department of physiology and biophysics at the University of Iowa, there are three types of fasting experienced by

hibernators. The first type is common among woodchucks, which arise from hibernation to normal metabolism about once a week. They do not eat during this wakened period.

The second type is found in small hibernators like chipmunks who store food for their dormant period. They come out of hibernation every four to ten days to eat copiously before returning to their winter sleep.

The last type of fasting is seen in bears. They remain dormant for as long as seven months, never completely coming back to normal metabolism and never eating anything. Their body temperatures do not drop drastically as in the smaller hibernators.

The definition of a "true hibernator" has been a controversial one because, as Wunder said, animals' torpid responses differ from species to species. The most controversial mammal has been the bear — some experts describe it as the most unique, sophisticated hibernator of all, while others describe its dormancy as simply winter lethargy.

Wunder explained that common Rocky Mountain hibernators such as ground squirrels, marmots and chipmunks all experience the characteristics of torpidity and also have an extra physiological mystery called brown fat — a unique system that brings them out of hibernation.

Brown fat is a complex system of blood vessels that carry blood straight to the heart and lungs, stimulating the animal out of hibernation. Experts are not sure what kicks the stimulating effects of brown fat into action. The animal goes through a reverse hypothermia, Wunder said, shivering first as it warms up to normal metabolism.

None of the hibernators with brown fat stay dormant all winter. They come completely out of hibernation every two to 14 days for up to 24 hours before returning to their deep sleeps. Many of them must eat and eliminate during this wakened period and all are totally defenseless during hibernation. According to Folk, this awakening action is a very energy-demanding process, making them much less efficient hibernators than bears.



Researching for the Colorado Division of Wildlife, Mark Haroldson measures a cub he borrowed from its hibernating mother in southwestern Colorado.

Bears do not have brown fat. They do drop their body temperatures, but usually only about eight to 10 degrees Fahrenheit, where other hibernators drop to the temperature of the surrounding air. This is probably because, according to Folk, it would take an animal of such mass too long to warm up if its temperature dropped any lower.

A bear's heartbeat drops drastically, from an average of 72 bpm in the summer to 39 bpm during hibernation. Such a drop in metabolism is normal in other hibernators, but unlike the others, the bear remains in a dormant metabolic state throughout the entire hibernation period. And according to both Folk and Tom Beck, wildlife researcher with the Colorado Division of Wildlife, who has extensively studied bears in southwest Colorado for three and one-half years, bears never eat, drink, urinate or defecate during the hibernation period. The urea that is produced during a bear's hibernation is changed into a storable form that is not harmful to the animal.

Some other hibernators also abstain from food and don't eliminate, but it's the bear's combination of these characteristics that makes it such a sophisticated hibernator in Folk's and Beck's view.

The bear's ability to arise easily to full comprehension of its surroundings is a definite advantage for survival, Beck said, particularly true for females who give birth and nurse during hibernation.

Beck also explained that bears do not eat for about two weeks after they come out of hibernation. When they do begin eating, they go for soft, easily digested foods. Then they reach a "normal eating stage" that lasts throughout the late spring and summer. In late summer they enter an "eating frenzy" stage, Beck said. They drastically increase their food intake — up to five times as much as normal to prepare for their upcoming hibernation. Beck said grizzlies have

been known to eat 50 pounds of food per day during this stage.

The badger is another animal without brown fat that is not traditionally considered a hibernator. But Hank Harlow, assistant professor of zoology at the University of Wyoming, has researched the animal for three years and has found that it shows many hibernator characteristics. He said during one winter when the temperature remained between 20 and 30 degrees below zero for many days, badgers he was monitoring stayed in their dens for 90 days without food or water. He explained that badgers go through a daily torpor — in nine hours time the heart rate drops 50 percent and temperature drops between 11 and 12 degrees. The badger remains in that condition for four hours and then comes back to normal metabolism in about six hours. Harlow said this drop saves the badger 25 percent of his daily energy requirements.

Wunder said most people are unaware of the many animals that do not hibernate. Most tree squirrels, weasels, pikas, the famed black-footed ferret and most mice do not hibernate. Instead, they must find food and try to stay warm.

Wunder said fish lay on extra fat for winter and slow down, but they do not hibernate. The greatest danger for fish in winter is lack of oxygen. In an iced-over lake with heavy biotic debris at the bottom, oxygen is depleted easily. As a result, large fish kills are not uncommon during heavy winters.

Most bats migrate from the Rocky Mountain area to Mexico for the winter, Wunder said, but they also experience a daily torpor, similar to the badgers.

He also said hummingbirds and swifts go through a daily torpor, probably because of their high metabolic rate. However, birds handle winter better than all of us — they simply fly south to bask in the warmth. □

Announcing: January 22



Utility regulators in the Rockies are generating all kinds of controversies as they hike rates. We've talked with two to discover their different approaches to those they regulate and the consumers they represent. And, what's it like to work on an oil rig? We'll spend a day with a roughneck to find out. Then, follow HCN as we talk with Robert Jantzen, head of the U.S. Fish and Wildlife Service.