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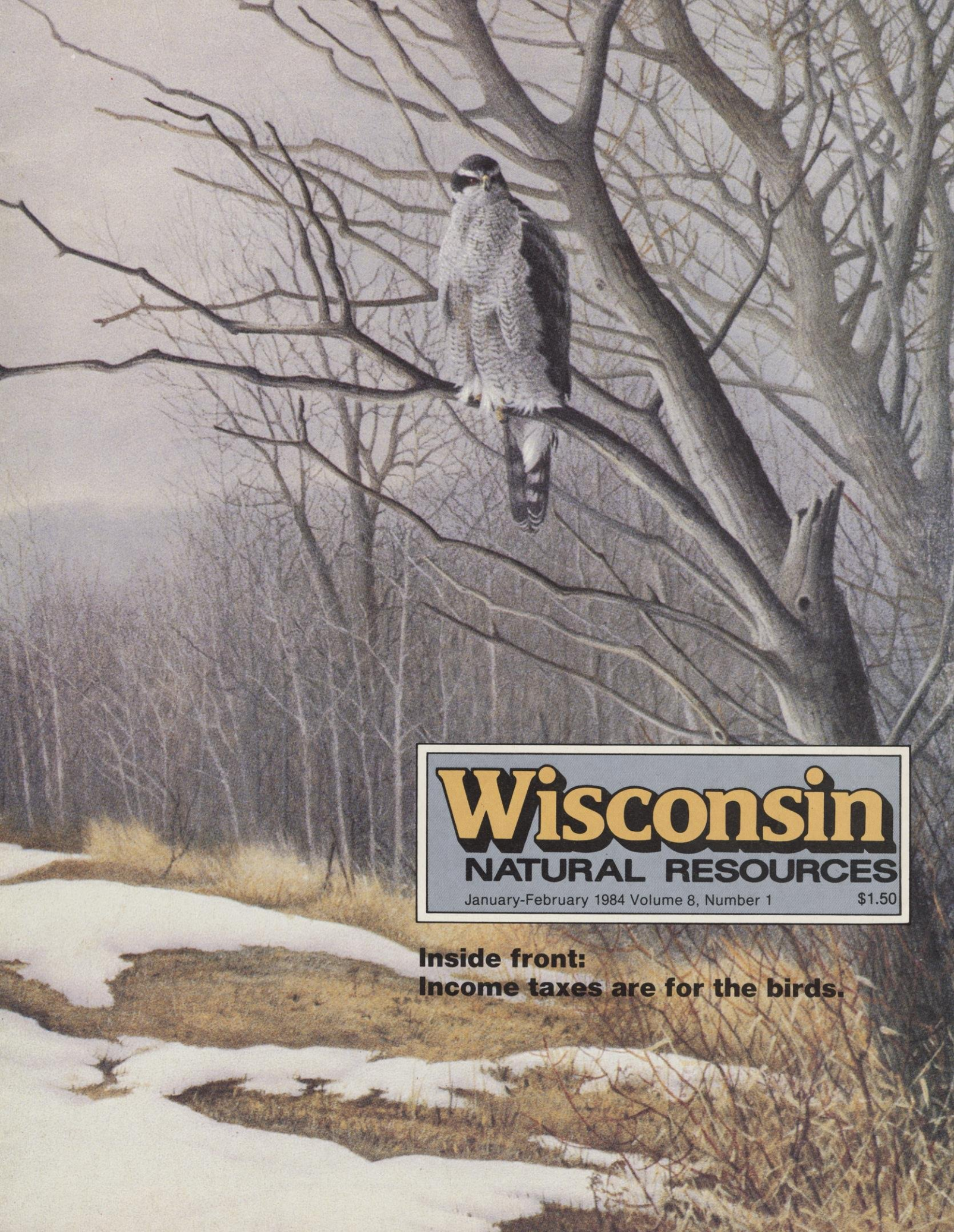

Wisconsin NATURAL RESOURCES

January-February 1984 Volume 8, Number 1 $1.50

Inside front:
Income taxes are for the birds.

Woodland Bandits-Chickadees.
Painting by Artist Daniel Smith, courtesy of the Leigh Yawkey Woodson Art Museum, Wausau.

Income taxes are for the birds

INGA BRYNILDSON, DNR Public Information, Madison

Look for the life line

Line 19 on the short form and line 54 on the long version of the Wisconsin income tax form lets you return a gift to wildlife through the Endangered Resources Fund.

54. Endangered Resources Donation (decreases refund or increases amount owed) Such as $2, $10, etc. ⑤④ _____

The cost of the wild

The *call* of the wild is enjoyed by all Wisconsinites. Whether it be the yodel of a loon on a northern lake or the chirp of a chickadee in the backyard, Wisconsin's wildlife adds a sense of wildness and pleasure to our lives. However, the *cost* of the wild is not shared by everybody. Historically, hunters, anglers and trappers paid for wildlife management through sport license fees. Understandably, much of this money has gone to manage game wildlife. Unhunted or "nongame" wildlife subsisted on the general benefits of game management. Today, however, changing land use, pollution and illegal killing put stress on all wildlife and intensify the need to manage endangered and nongame wildlife.

Now there's a new opportunity for all Wisconsinites who enjoy the call of the wild to share in the cost of the wild. By donating to the "Endangered Resources Fund" on your state income tax form, you can help manage and preserve endangered and nongame wildlife, and wild habitat.

Your contribution to the Endangered Resources Fund may help buy a radio transmitter to track the movements of one of Wisconsin's twenty gray wolves, or pay for materials to build a nest platform for a homeless pair of loons. Or, your donation could help purchase critical habitat for a cluster of endangered white lady's-slipper orchids, or a bare sand beach for a colony of endangered terns. Your gift to wildlife may help restore pine martens, barn owls and peregrine falcons which disappeared years ago from Wisconsin' wild lands.

The state's scientific and natural areas programs will also be funded by your contributions. Natural areas are refuges for native plants and animals and an important part of our national heritage.

Small remnants such as old-growth forest, native prairie, small undeveloped lakes and bogs, need to be found, protected and surveyed soon since they are rapidly being lost. The best remaining examples, added to the system of state scientific areas, preserve not only the endangered and sensitive species, but also the natural biological processes. We need to understand these processes and apply this knowledge to manage Wisconsin's forests, marshes and cropland for long term productivity.

Wisconsin's nongame and endangered wildlife are banking on your donation to the Endangered Resources Fund on your state income tax form. Return a gift to wildlife — wildlife is sure to return its gifts to you.

The chickadee checkoff

"That whimsical fellow called Evolution, having enlarged the dinosaur until he tripped over his own toes, tried shrinking the chickadee until he was just too big to be snapped up by flycatchers as an insect, and just too little to be pursued by hawks and owls as meat. Then he regarded his handiwork and laughed. Everyone laughs at so small a bundle of large enthusiasms."
Aldo Leopold

Over half the states in the nation have adopted programs similar to Wisconsin's Endangered Resources Fund. Nationwide, it's been nicknamed the "Chickadee Checkoff." The black-capped chickadee is a familiar and welcome sight throughout Wisconsin. As a songbird it qualifies as one of the state's 503 nongame animals. Now you can have your own chickadee checkoff through the Endangered Resources Fund on your Wisconsin tax form.

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Cover: Unplowed Adams County Road — American Goshawk.
Painting by Artist Jonathan Wilde, courtesy of the Leigh Yawkey Woodson Art Museum, Wausau.

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Wisconsin: target for a nuclear waste dump

JAMES KLEINHANS, Executive Director, Radioactive Waste Review Board

Nuclear power plant at Two Rivers, Wisconsin.
DNR photo by Dean Tvedt.

The federal Department of Energy will be challenged at every turn by the Wisconsin Radioactive Waste Review Board as time ticks toward selection of a nuclear waste repository in 1990.

Wisconsin might be the site of the nation's second high level nuclear waste dump. It is one of 17 crystalline rock states being considered. The Nuclear Waste Policy Act of 1982 calls for three sites to be selected for full scale geologic investigations by July 1989. A second repository will be selected from among the three in March of 1990. It has already been determined that the nation's first repository will be somewhere in Nevada, Texas, Mississippi, Utah or Washington where exploratory mineshafts are now being investigated as part of the final selection process.

On our own doorstep, the federal Department of Energy (DOE) is studying the underlying granite formations in Wisconsin, Minnesota and Upper Michigan. Other crystalline rock formations under study are located in the northern and southern Appalachian areas of the eastern United States.

At this point, DOE is in the "regional" stage of its investigation. It has completed a draft of the geological and environmental characteristics of the three-state North Central Region, and a final report is due in November, 1984. The next stage—identifying specific "areas" within the regions—is scheduled to begin in early 1985. Field work will begin during the "area" investigations.

Concerned that DOE will not consider the "unique features of the state and needs of the people of the state" in the selection process, the Wisconsin Legislature in 1981 created the Radioactive Waste Review Board, which is to "serve as an advocate for the people of the state before the federal government and to ensure a maximum of public participation in the assessment process."

The Legislature also created two councils to provide advice to the Board, one concerned with policy, the other with technical matters.

The Review Board is actively monitoring DOE activities, providing critical comments on DOE technical reports, formulating a public information program, and negotiating a written agreement to cover DOE activities in the state.

The Board has adopted a policy that state agencies should cooperate with DOE only to the extent required by Wisconsin's open records law until the two parties have entered into a written agreement.

In its efforts, the Review Board, through the Technical Advisory Council, has called upon the best scientific and technical minds in state government and the university system to review and comment on DOE technical documents. When necessary, the Board stands ready to challenge in court DOE decisions that are not deemed to be in the best interests of the people of Wisconsin.

Wisconsin's relationship with DOE has been generally confrontational ever since DOE's publication in 1978 of a draft environmental impact statement. That statement included a reference to a supposedly-hypothetical site based on Wisconsin and Minnesota environmental data.

Conflicts between Wisconsin and DOE have centered around three issues:

- DOE's failure to provide the state with full and accurate information about its activities regarding Wisconsin;
- DOE's unwillingness to negotiate a binding written agreement with the state prior to carrying out research in Wisconsin;
- DOE's failure to respond satisfactorily to the state's finding of major technical deficiencies in DOE program documents.

Given the lack of proven technology for safe disposal of high-level waste, the Review Board is on record as opposing construction of a regional or national repository in Wisconsin. Governor Earl has also registered his opposition to a repository in Wisconsin. In April, 1983, Wisconsin voters opposed construction of a repository by a seven to one margin.

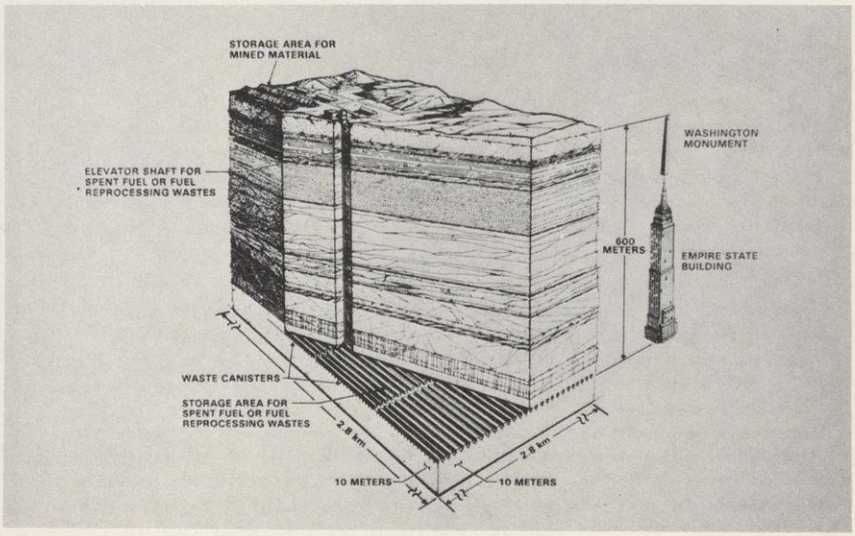
Highly radioactive wastes have been accumulating since the beginning of the nuclear age more than 30 years ago. Most of these require special handling to avoid the health hazards associated with radiation. Nuclear wastes are divided into four categories:

- High-level;
- Low-level;
- Transuranic;
- Uranium mill tailings.

The most radioactive and dangerous, high level wastes are characterized by heavy radiation which decays rapidly. They may also contain quantities of slow-decaying transuranic (heavier than uranium) elements. High-level wastes must be handled by remote control behind heavy protective shielding. Whether reprocessed or not, they will remain dangerously radioactive for thousands of years and must be isolated from the biosphere. In addition, both spent fuel and reprocessed wastes remain not only radioactive, but thermally hot for long periods of time.

High-level wastes are produced by nuclear reactions in the fuel of both commercial and defense reactors. Commercial spent fuel, now in temporary storage pools at reactors sites, totals approximately 9,000 tons, which would fill a football field about two feet deep.

As of July, 1983, there were 84 commercial nuclear power reactors generating electricity in the United States. An additional 56 reactors were under construction with five in the planning stage. By the year 2000, the Atomic Industrial Forum expects about 145 commercial reactors to be generating electrical power and producing high-level waste.



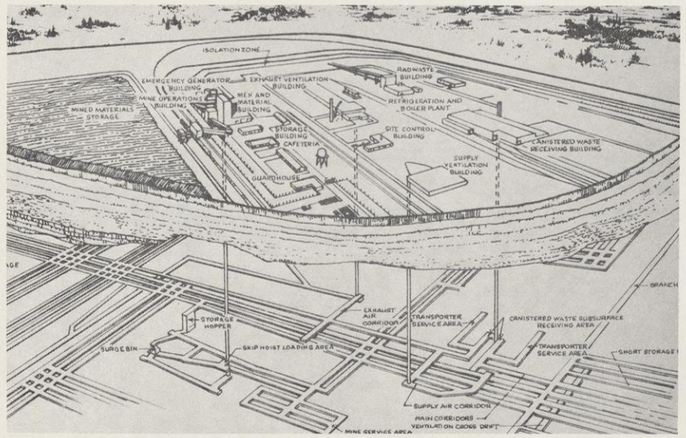
High level nuclear waste would be stored in a mine-like facility 1,500 feet deep.

In Wisconsin, we have four nuclear power plants: Point Beach 1, Point Beach 2, Kewaunee, and Genoa. They provide more than one-quarter of Wisconsin's electricity, and supply the residential, commercial and industrial needs for well over one million persons.

The federal government has determined that geological disposal of high-level nuclear waste as spent fuel or solidified waste for reprocessing will best isolate these contaminants from the environment. It is hoped they will then pose no significant threat to public health and safety. Whether there will ever be any commercial reprocessing is uncertain at this time. Military wastes are being reprocessed, and may be disposed of in the same repositories as civilian wastes, pending a presidential decision.

DOE points out that in at least 15 countries, deep geologic formations are being studied for nuclear waste isolation. In the United States, concepts for isolating high-level wastes have been under study for 20 years.

According to DOE, laboratory tests show that several different rock types have characteristics that make them acceptable for geologic waste isolation where suitable sites can be found. Studies are now underway in several parts of the US to identify potential repository sites in the various rock types. They include salt domes in Louisiana and Mississippi; bedded salt in Texas and Utah; basalt (solidified lava) in Washington state; tuff



The nuclear repository might cover 12,000 acres. It would include a 400-acre central core surrounded by a 2,000-acre inner control area, equivalent in size above ground to the underground storage dimensions. Many surface installations would be necessary in addition to the nuclear waste handling facility.

(compacted volcanic ash) at DOE's test site in southern Nevada; and granite and other crystalline rocks in the upper Midwest and in the northern and southern Appalachian areas.

Any type of rock formation considered for a repository must be large and stable, and must not allow nuclear wastes to be released through flowing groundwater or other geologic processes. Rock characteristics examined in selecting a site include natural moisture content, strength, heat capacity and conductivity, permeability, porosity and solubility.

Regardless of the rock type selected, DOE says the geologic repository system will include a combination of natural and man-made (engineered) barriers to any unexpected release of nuclear waste. This concerns the Wisconsin Review Board because DOE may find it expeditious to rely on engineered barriers in the absence of desirable geologic formations.

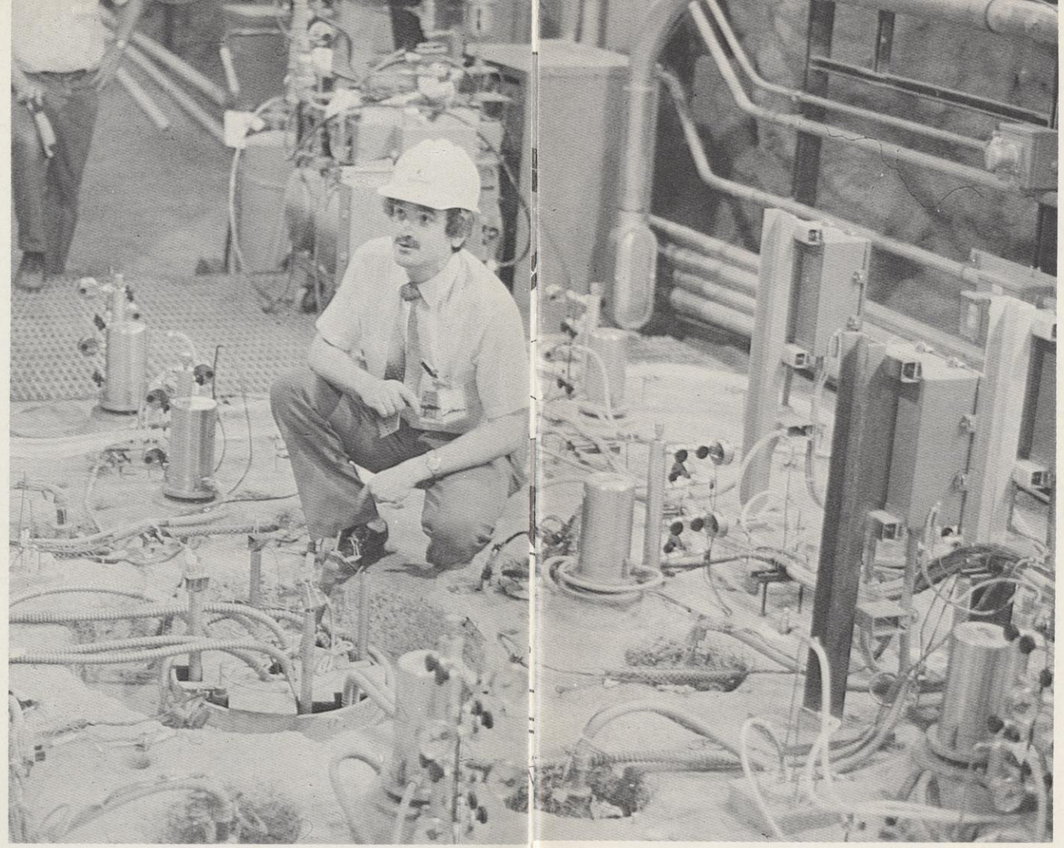
A DOE publication, *What Will a Nuclear Waste Repository Look Like?* indicates that the storage site will resemble a large underground mine. It will consist of a nuclear waste handling facility at the surface and excavated tunnels constructed about 1,500 feet below the surface.

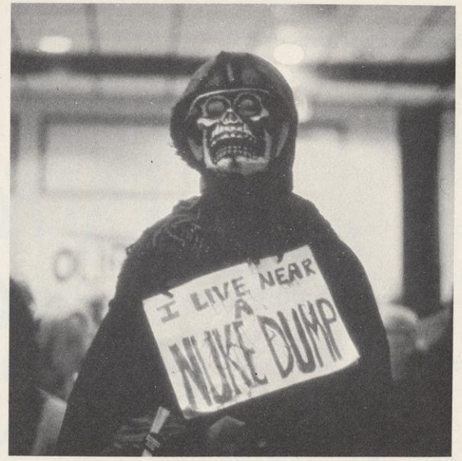
On the surface, a central area of about 400 acres will contain buildings and other facilities for use during the expected 25 to 30-year operating period. An additional 50 acres may be required during the estimated eight-years of construction for temporary buildings, parking, material storage, and a concrete batch plant. The central area will be surrounded by a 2,000 acre inner controlled area, equivalent in dimensions to the underground working repository. Both surface and subsurface activities in these areas will be restricted. Beyond these will be an outer controlled area, possibly another 10,000 acres.

Surface structures will consist of railroad unloading sites, administrative buildings, warehouses, water and sewage treatment plants, an excavated rock storage area, and the principal structure, a waste-handling building. This will contain the facilities and equipment to handle solidified high-level waste or spent fuel. Canisters of high-level waste will be unloaded from shipping casks and transferred to a shielded cell. They will be inspected for integrity and then lowered through a waste shaft to the emplacement level where they will be moved to their final location in an underground tunnel by a shielded transport vehicle. The canisters will then be loaded into holes drilled in the floor or wall of the emplacement tunnel.

Separate shafts with elevators will handle personnel, equipment and nuclear waste canisters. Other shafts will provide ventilation.

In addition to geologic barriers that surround the repository, DOE intends to use various types





This death mask appeared at a meeting in Wausau last year to express Wisconsin's concern about possible nuclear waste storage here.
Photo by Robert Halstead.

◀ Heat given off by nuclear waste can affect the material in which it is stored. Here scientists test the heat capacity of a simulated storage site.
Photo by Robert Halstead.

For more information contact:
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Madison, WI 53702

of engineered barriers. As each storage zone is filled, the holes, tunnels and shafts will be backfilled and sealed. However, provisions are being made to provide for retrieval of the waste canisters for up to 50 years following the start of canister emplacement. Following closure, DOE intends to take all "reasonable means" to alert future generations to the locations and significance of repositories. Methods being considered include surface symbols such as architectural monuments, permanent records in public libraries and computerized information centers.

Each repository is planned to have a capacity of 70,000 metric tons of waste.

Whether or not Wisconsin is ultimately chosen for the second repository, it's expected that a substantial amount of nuclear waste will be transported over the state's highways and railways once repositories are in operation. And safe transportation is also one of the vital concerns of the Review Board.

As one would expect, DOE says high-level radioactive waste can be safely transported to a disposal site. The federal agency says studies show that any radiation exposure to the general population from routine operations of vehicles carrying shielded casks of high-level nuclear waste would be "insignificant." DOE says that if 1,000 casks carrying nuclear waste went by the same house every year, the increase in radiation exposure to the inhabitants would be less than one percent of the dose due to natural background radiation.

Furthermore, DOE stresses that there is no risk of self-sustaining nuclear reaction in a shipping cask. The spacing of the nuclear waste within each cask would make it impossible to bring enough radioactive material together to initiate a chain reaction, they say.

However, many experts are concerned about the potential consequences of transportation accidents or equipment failures, which could result in release of radiation. While the probability of an accident is extremely low, the consequences could be staggeringly high, causing hundreds of latent cancer fatalities and requiring hundreds of millions of dollars in cleanup costs. The Board is also concerned about the preparation of Wisconsin hospitals to handle victims of radiation contamination.

In addition there are many legal uncertainties about who (the Federal government? the utilities?) would be liable for damages in the event of an accident.

DOE's plans may be convincing, but the review board is wary. DOE intends to use unproven technology! The review board, therefore, intends to use all the tools at its disposal to challenge DOE assumptions in all stages of the selection process. The concerns of Wisconsin citizens will be heard. You can count on that!

Birds are picky

MARY SAGAL, Editorial Intern

If you want a lot of birds at your feeder, pay attention to the seed.

Niger thistle seed

It is early morning. A cardinal lands on the ground under the bird feeder and indulges in the sunflower seeds scattered there for him. Soon a host of redpolls, chickadees and purple finches swoop into the feeder above, all vying for a position, some chirping as they try to select a favorite seed among the flutter of feathers.

Nature in the backyard, right in town!

Bird feeding that attracts so many species though is not accomplished by simply putting out any old bird seed. It takes a little study and planning, plus some knowledge of the species that inhabit your area. And you have to be willing to pay the price. Bird lovers support quite an industry!

Americans spend $300 million per year on bird feeders, photographic equipment and bird baths, and $170 million annually on bird seed. But a lot of that bird seed money is nearly wasted. Almost half of it!

Scott Craven, Extension Wildlife Specialist at UW-Madison, puts it this way: "Many of the seeds commonly found in inexpensive commercial mixes such as wheat, milo, peanut hearts, hulled oats and rice are relatively unattractive to most birds. These commercial mixes may be cheaper but you will attract as many or more birds with "preferred seeds."

"This does not mean that unattractive seeds will not be eaten, but preferred seeds will be eaten first and tend to attract birds that may not otherwise visit a feeder."

Inexpensive seeds, or filler, bring down the cost per pound which is one reason they are added to commercial mixes. It's also a fact that, until recently, many seed producers didn't even know which seeds birds liked. Many seeds were just added to the mix in hopes they'd be eaten.

So the bird seed buyer must beware!

George Harrison in his book "The Backyard Birdwatcher," points out that milo, wheat and oats are among the least preferred seeds, yet, 41% of commercial mixes consist of these grains. With so much filler added, these poor commercial mixes just don't attract many different species. Using them, it's virtually impossible to develop a specialized feeding program for favorite birds.

"You can feed birds virtually any mix. If you buy the economy mix there will be waste. If success is number one in your book, meaning the number and kinds of birds, the economy size won't work. Everything in the more expensive kind is edible. What and how you buy will depend on a number of factors such as bird feeding goals, cost and availability," comments Craven.

However, not all birds eat the same type of foods and some make specific changes during certain times of the year, for example when raising young. So, when starting a feeding program or revising a current one, remember that eating behavior falls into three different groups. Carnivors favor meat, herbivors like seeds and fruits and omnivores eat both.

In general, most birds are omnivores, changing what they eat according to food availability and weather. "Backyard birders must capitalize on the bird's food preferences and natural foraging," according to Banquet for Birds, a pamphlet published by the Madison Audubon Society.

When purchasing bird seed, "there are four varieties to look for: sunflower, cracked corn and white and red proso. White proso is more popular

Female cardinal at sunflower feeder.
Photo by the Wisconsin Society for Ornithology.

Striped sunflower

White proso millet

than red," explains Carol Luetkins, executive secretary for Madison Audubon. The two best are white proso millet for birds that like small seeds and black oil-type sunflower seeds for birds that like larger seeds.

Low cost white proso is a tiny annual cereal grain which mainly attracts ground feeders like juncos and many species of sparrows.

Sunflower comes in two varieties: the large gray striped seed and the small, black oil-type. Says Craven, "Overall, small black oil-type sunflower seeds give the most for your bird feeding dollar. The larger, more familiar gray or black-stripped sunflower seeds are also excellent food, but given a choice, most birds take the small black ones. All sunflower seeds have high caloric value. About 70% of the weight of an oil-type seed is kernel compared to 57% for the traditional types. Although not as well known as the striped sunflower seeds, the black seeds are as readily available and sell for about the same price."

Oil-type sunflower

Commercial mix

Seed photos by Scott Craven

A variety of seeds at the feeder brings a variety of species. Says Luetkins, "Once you see what you can attract, you can branch off to different seeds to get specific birds."

Cracked corn is favored by more birds than any other seed. Especially attracted to it are pheasants, quail and mourning doves. Birds like fine cracked corn, or chick corn better than the course kind.

Another popular seed is niger, a relative of the sunflower grown in Asia and Africa. This small black seed is extremely popular with finches. Pine siskins and redpolls like it as well. However, niger is relatively expensive and really should be used with a special feeder.

Because of its high cost, several feed companies bag a product called "finch mix" which is made up of niger and other seeds. It does not attract as many birds as straight niger.

Sunflower fines, peanut butter and suet can broaden your feeding program, are relatively inexpensive and usually very easy to find.

Sunflower fines are finely ground, hulled sunflower seeds. Small birds such as goldfinches, which have difficulty cracking sunflower hulls find this particularly attractive.

Woodpeckers of course like suet. It works best when melted and mixed with dry foods such as oatmeal, cracked corn or hulled sunflower kernels. Beef suet is most popular.

Table scraps, bread crumbs and bakery products are good supplements, but often attract birds such as house sparrows, grackles and starlings, which are aggressive and may keep other species away. Water and grit are important adjuncts to good seed. Birds use water to drink and bathe. Providing it often saves a long flight to a natural water source. Birds need grit to help digest their food. It shouldn't be mixed with seed but rather set out separately.

Places to look for good seed are your local Audubon chapter, nature center or outdoor sports club. Often these organizations sell seed as a fund-raising activity. Madison Audubon for example, has a big sale each fall featuring all the preferred seeds as well as bird feeders, baths and bird information.

Some pet stores sell the preferred seeds but variety may be limited and the mixes might contain filler.

Establishing a successful bird feeding program takes time, patience and money. But gazing out the window on a frosty winter's day to see your first redpoll at dinner, or watching a chickadee wing into the feeder to nibble a sunflower seed makes it all worthwhile. Just remember, in winter don't stop feeding. The birds need you as much as you need them.

Is development a dirty word?

An unprotected bank at an apartment construction site is guaranteed to cause erosion problems.

SUSAN BERGQUIST, MARITA ROHERTY and ANNE WEINBERG, Bureau of Water Resources Management

Erosion and stormwater runoff from construction in urban areas cause more siltation than any other land use. While the state cannot force communities to correct this, many are passing ordinances on their own to protect local lakes and streams.

Nonpoint source pollution is often regarded as a rural problem since runoff from improperly managed barnyards, feedlots, croplands and woodlots carries sediment, animal wastes and other pollutants into streams and lakes. However, two frequently overlooked sources of nonpoint pollution are construction sites and impervious paved surfaces, both of which are characteristic of urban and developing areas.

Construction sites are often stripped of all natural vegetation, exposing soil to the full brunt of rain and snowmelt which rapidly and extensively erodes the soil. Construction sites may have extremely high erosion rates—between 30 and 200 tons of soil per acre per year. This is 10 to 20 times that of croplands. Even a small amount of construction may have a significant negative impact on local water bodies. Sediment from construction sites may reduce water quality for municipal, industrial, recreational and wildlife uses; fill in lakes and streams; and physically damage or kill aquatic organisms.

Graveled driveway at a new construction site is good practice.

Of equal, if not greater, significance than erosion and sedimentation is the increased volume of stormwater runoff caused by urbanization. The amount rises steadily as paved surfaces such as roads, sidewalks and rooftops reduce infiltration into the ground. This increased runoff may also carry larger quantities of pollutants such as suspended sediment, nutrients, and toxic chemicals and may increase streambank erosion and downstream flooding.

Control measures can avoid these problems. The goal is to prevent erosion during and after construction from exceeding that which would have occurred if the land had been left in its undisturbed state. In practice it is usually impossible to make this comparison. Therefore, standards are set by specifying certain practices which must be used. A developer may be asked to follow a particular technical guide such as *Minimizing Erosion in Urban Areas*, written by the Soil Conservation Service. In other cases, a checklist of minimum measures will be provided.

An ungraveled site means mud that eventually dirties lakes and streams.

The traditional approach to stormwater management has stressed removing water from the site as quickly as possible. However, this approach tends to aggravate flooding and erosion downstream. Nowadays the goal after construction is peak runoff rates no greater than those which existed when the land was undeveloped. This is accomplished by trying to retain rainfall to increase infiltration, and by detaining stormwater to reduce the amount and rate of runoff. Both stormwater management and erosion controls are best planned before a site is developed.

This preventive approach has economic advantages. Even in urban settings, topsoil is a valuable commodity. Problems such as sediment-clogged culverts and storm sewer inlets, sediment-laden water bodies and eroded streams are more expensive to remedy than to prevent. This is especially true as the extent of urbanization increases. Then traditional methods of stormwater removal may require very expensive replacement of storm sewers to accommodate increased flows.

Erosion control and stormwater management can be carried out voluntarily or through enactment of rules. Currently there are no statewide regulations. However, DNR and regional planning agencies actively encourage local governments to voluntarily adopt ordinances that control construction erosion and manage stormwater. Model ordinances, informational materials, and help with ordinance language as well as supporting testimony and help with implementation procedures are all available.

Sometimes an existing ordinance can be amended to address erosion and stormwater; in other cases an entirely separate, comprehensive ordinance must be written expressly to address the problem. Existing regulations which can be amended include subdivision ordinances, zoning ordinances, shoreland zoning ordinances and building codes.

The state subdivision platting law imposes minimum requirements for the division of land, mostly related to surveying standards. However, local governments may adopt a local subdivision ordinance which includes more restrictive provisions, including measures to control erosion and runoff. Several counties, including Jackson, Rock and Sheboygan, have recently amended their county subdivision ordinances to include construction runoff and erosion control requirements for subdivision plats.

Although shoreland zoning ordinances are required in all counties, amending them for management of stormwater and erosion would provide very limited control. They apply only to construction within 300 feet of rivers and 1,000 feet of lakes in unincorporated areas.

Since zoning ordinances define areas of specific uses, amendments can be enacted for a variety of construction site and stormwater controls. For example, Green Bay zoning ordinances now contain clauses controlling stormwater detention.

State law also allows local governments to amend building codes to include runoff and erosion controls. One advantage of using building codes is ease of enforcement through the issuance of building permits and building inspections. This approach is especially useful as a supplement to subdivision ordinance amendments because it can include projects for which a subdivision plat is not required, such as single-family home construction.

Freestanding, specific ordinances controlling erosion and runoff can be enacted by cities and villages, but not by counties or towns. While enacting a new ordinance may be more difficult than amending an existing one, free standing ordinances are more visible and are detailed for a specific purpose. Several communities around the state, ranging in size from the City of Madison (population 170,616) to the Village of Ephraim (population 319) in Door County, have recently adopted comprehensive ordinances. All are based on a model ordinance developed by the Dane County Regional Planning Commission and designed to prevent construction erosion and minimize stormwater runoff.

Madison residents were concerned about the many adverse effects of sediment entering the city's valuable lakes. For example, it was estimated that 25 to 30% of the sediment entering Lake Mendota from the Sixmile-Pheasant Branch Watershed on the lake's west side comes from construction sites. Half of that amount originates within city limits. River Falls recently adopted a similar comprehensive ordinance. There, city officials became concerned when construction of university buildings and subdivisions increased runoff dramatically, which in turn eroded a drainageway and carried large quantities of sediment into the Kinnickinnic River, a Class One trout stream. Since the city will spend an estimated $250,000 to stabilize the situation, city officials sought an ordinance that would prevent similar future problems and expenditures.

Under the Madison ordinance, builders are now required to install specific erosion control and stormwater management practices for certain types of "land disturbing activities." Specifically, erosion controls are required for land disturbances of more than 4,000 square feet. Of particular importance is the requirement of erosion control practices for the construction of single family homes since even a small amount of construction with extremely high erosion rates can cause significant problems. For small land disturbances that cover anywhere from 4,000 square feet to one acre, a simple checklist of basic erosion control practices must be followed. These include using hay bales to filter runoff, applying gravel to driveways during construction to minimize tracking of mud, seeding and mulching disturbed areas, protecting dirt stockpiles to prevent erosion and street cleaning. Erosion from land disturbances such as gardening, small home additions and agricultural land use is not regulated. When projects will disturb more than one acre, the contractor or developer must submit a plan for controlling erosion. Urban stormwater management plans are also required if the construction area is greater than three acres. These plans must be approved prior to issuing a land disturbing permit. Once a permit is issued, sites are inspected by city staff to ensure control practices are implemented.

Technicians survey sediment deposit in the Kinnickinnic River at River Falls where the city recently passed a comprehensive ordinance to control erosion.

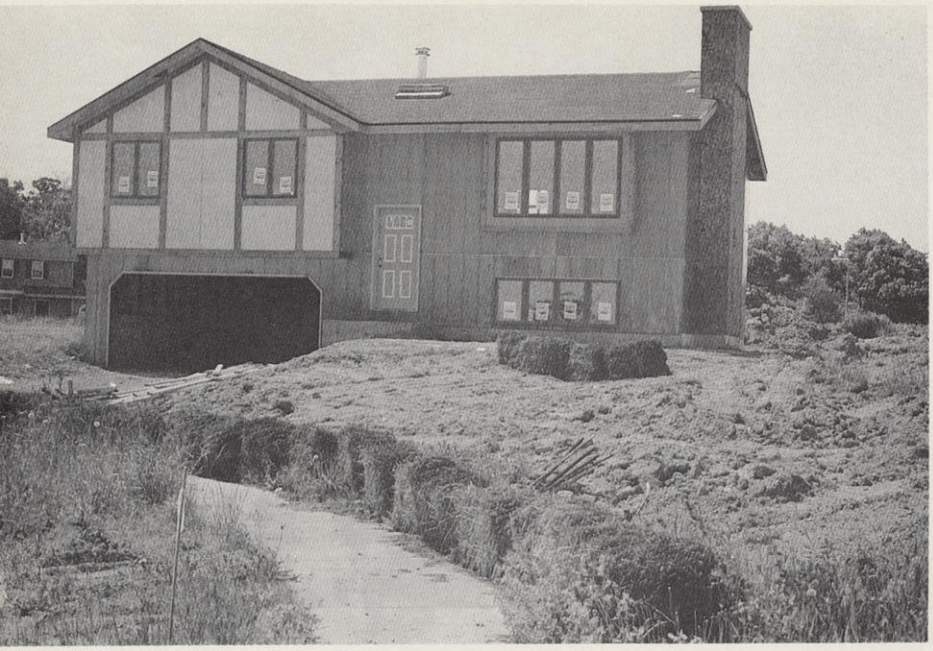
The ordinance was developed by the Madison Commission on the Environment and was debated for over three years. Primary opponents were building contractors and developers who were concerned with the added construction costs and regulations. However, in the end, the City Council adopted the ordinance, encouraged by the Department of Natural Resources, the Dane County Regional Planning Commission, city staff, environmental groups and a number of committed Madison residents. Criticism by developers and even some building inspectors has been rife. One said, "It stinks!" And then called it "An ordinance passed by dreamers." A third commented that after 100 years of construction in Madison, Lake Mendota had not filled in.

Do ordinances really make a difference? The key, of course, is enforcement.

In Madison, city engineer Bob Schoenbeck says that since the ordinance passed a year ago there have been 91 permit applications, most of which fall into the less-than-one acre category. Schoenbeck says no major problems have been noted either with these or with the larger projects requiring a plan. However, he cautions that "It's a little early to judge the success of the ordinance. A year from now we'll know if it really works."

Discussions with Madison developers, contractors and building inspectors reveal a different perspective. There has been no change in their prepassage hostility to the construction erosion ordinance. Some think site erosion controls are needed but believe the new ordinance goes too far and that the old (minimal) laws were adequate.

John Kassner, builder and attorney for build-



Many builders oppose Madison's comprehensive ordinance which requires control of silt-laden runoff, but city officials say it's working. Here straw bales help check erosion at a local construction site.

ing associations, believes builders should be allowed to decide what is needed for each building site, then if problems arise fines should be levied. He feels builders would install controls to avoid being fined.

William Bakken, unit director for building inspection in Madison, emphasized the city's intention to enforce erosion controls for every project. Noting that some inspectors are negative about the ordinance, he said differences in opinion are an example of some of the obstacles which must be overcome to enforce the new erosion ordinance. Inspectors, Bakken said, are accustomed to solving problems, rather than preventing them. Inspectors need to expand the scope of their awareness to include the entire construction site as well as the structure. Ongoing staff meetings are being used to generate support for this perspective.

Both Bakken and builder Terry Monson raised the issue of regulating urban areas while problems in adjacent rural and agricultural areas go unchecked. Monson feels "urban areas are penalized;" Bakken says this is a common issue at meetings with builders and inspection staff.

Similar to Madison, the City of River Falls has seen only single-family home construction rather than larger commercial projects in the past year. City engineer Dave Sonnenberg reports that the ordinance checklist "is working well and seems to be generally accepted. The most noticeable improvement has been prevention of soil tracking onto city streets. Ordinance provisions governing larger projects probably won't be tested until next season."

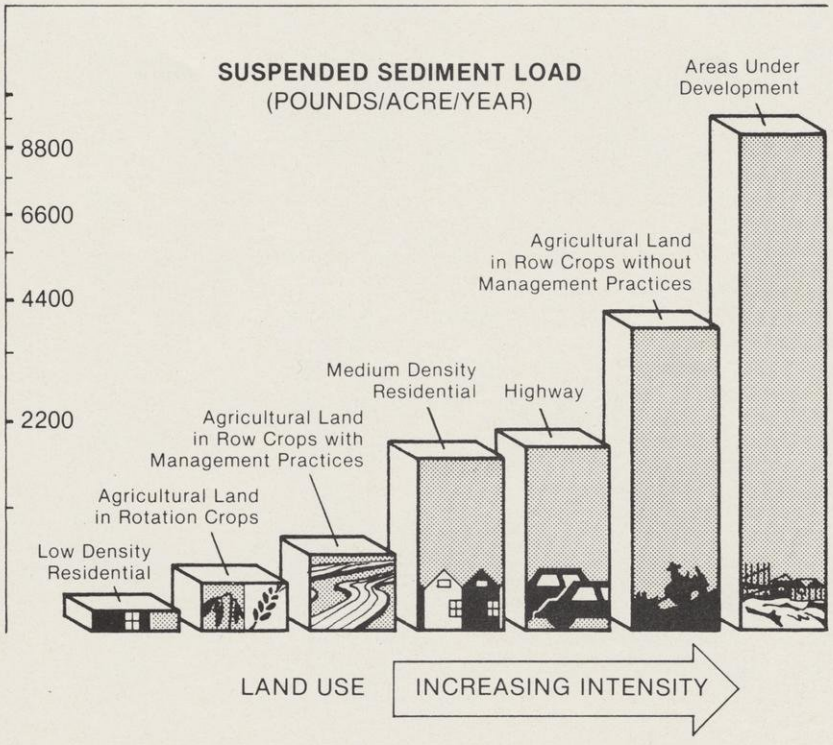
Middleton's free standing ordinance has been in place longer than almost any other (four years). However, until recently, enforcement occurred only on large projects. During the past year city engineer John Lichtenfeld has worked closely with builders to achieve compliance at all single-family home construction sites. "Cooperation is stressed," he states, "but in a few cases several stop-work orders had to be issued before all required measures were installed."

Cliff Lawton, who serves as zoning administrator and building inspector in Middleton, feels the ordinance has been a success. He has been able to achieve desired environmental controls while meeting contractors' needs by working with them to solve problems and build trust and support. He says it hasn't been easy, and there have been problems with a few contractors and unsupervised subcontractors who haven't taken the ordinance seriously. Middleton achieves greater control over builders by issuing a "starter" permit but withholding the actual building permit until erosion controls are in place. Lawton says that having the ordinance "is a continuing educational process for both inspector and contractor but it works."

Officials in Rock, Sheboygan and Jackson counties report that there really has been no opportunity to test their ordinances, as there have been no new subdivisions in those areas in the past year.

At the present time, participation in all nonpoint source pollution control programs is voluntary. The state provides cost share funds and administrative, technical and educational assistance to several projects in selected watersheds in both rural and urban areas. While the control of nonpoint sources in rural areas depends mostly on the participation of individual landowners, the control of construction site erosion and urban stormwater will depend on the cooperation of counties, cities and other local municipalities. Stormwater, in particular, is best managed on a watershed basis. Activities upstream influence events downstream and political boundaries rarely coincide with watershed boundaries. Therefore, cooperation between units of government is essential.

This graph shows the suspended sediment load for various activities. Cities resent the lack of mandatory runoff controls in rural areas.



Browse line in winter is a telltale sign of hunger.

Morning death

GEORGE HARTMAN, retired DNR deer specialist

This fawn awaits death from starvation.

Deep snow, cold and too many deer can kill.

Almost like a sleeping dog, the deer lies on its side, neck outstretched, as I approach. The night's inch of fluffy snow over the 20 crusted inches already on the ground, makes my approach a silent one. Silence, however, is unnecessary. The deer, a fawn, is dead.

The ratty look of its face indicates starvation. The heavy winter coat softens the deer's body contours, but even by running by mittened hand over its back I can feel the boney thinness of severe malnutrition. After cutting through the thin ham with my hand axe I break the femur. Instead of solid white fatty marrow, I find it to be thin, red and jelly-like, a condition which confirms starvation.

In spite of the near zero temperature the animal is only partially frozen. Death came only a few hours earlier. Opening the body cavity and

Inspection of a winter deer yard shows animals tried to eat thumb-sized vegetation before succumbing to hunger.

Attempts to rescue deer weakened from starvation usually fail.

cutting the paunch, I find that the fawn's last meal consisted of stems of tag alder, hazel, and a few red pine needles, all stuffer foods.

I write up my field notes. As I am about to leave I see the fawn's footprints in the snow fluff. Backtracking the prints only a hundred feet or so, I find several places where the fawn had fallen. Here it browsed on a badly chewed small red pine, there on hazel, and down in the swamp edge it fed quite extensively on tag alder. I look for better deer food species: red maple, jackpine, aspen and cherry. They are here but mostly in sizes above browse height. I observe the lower branches of these trees. Even those of the starvation species show a heavy browseline to a height deer can reach. The finger-thick aspen stubs show that their diets this winter consisted more of wood than of nutritious barks and buds. The best central Wisconsin winter deer foods — wintergreen, swamp dewberry, cranberry, blueberry and a number of other ground cover plants — have long been sealed under the crusted snow. A few futile pawings show at the base of larger trees where adult deer tried but failed to get at the ground cover plants. Tracks of a larger deer join the fawn in the tag alder. Scuff and fall marks and a gob of deer hair show where it knocked the fawn down. No mercy here.

I return to the carcass and sit down on a nearby fallen tree to rest and think. This is my first starved deer find of the season. I will find more, as it is only mid-February. March is the bad month, and deer can be lost in April too. Even after the snow is gone some of the hardpressed animals will die. They are just too far gone to recover.

I review the factors that are involved, and of course search for a solution. Basic problems are too many deer and the long harsh winter. High deer populations are the result of favorable winters and human effort such as eliminating predators, establishing refuges, holding conservative deer seasons, logging and burning of mature forests, creating forest openings and introducing farm crops.

I look at the dead fawn. For a moment I visualize it as a beautiful summer spotted fawn — and then as it was in its gray October coat. I think of the November hunting season when we shoot deer by the thousands. Then, most, but not all of the deer die quickly. True, there are crippling losses, and that too makes me sad. I ponder a bit about more humane solutions than hunting, but can find none. It is hard to accept the idea that all living creatures must die. I readjust my snowshoe bindings, and as I hike to the car I find some solace in the knowledge that most of our bullet-killed deer die quickly. Deer hunting is a better alternative than starvation any day.

From the 1983 Wisconsin Deer Hunting Special.

Research News

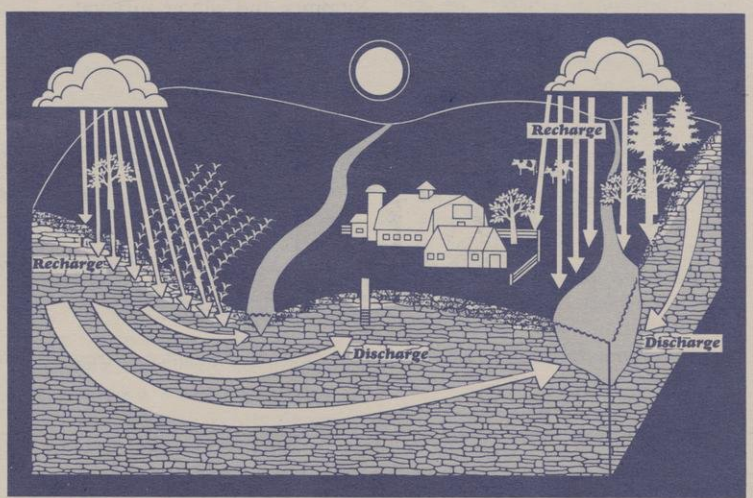
By Jennifer Haack, Editorial Intern

Acid rain — a test of the trickle down theory

Madison — DNR research is part of an environmental team that is developing a mathematical model to describe the effects of acid rain.

The team includes Dr. James Bockheim, a UW-Madison professor, who is looking at how the terrestrial environment influences acid rain before it enters the groundwater; Dennis Wentz of USGS who is analyzing groundwater; and DNR researcher Paul Garrison who is studying biological, physical and chemical characteristics.

The two lakes being studied, Round Lake in Douglas County and East Eight Mile Lake in Bayfield County, are seepage lakes and have no surface water inflows or outflows. Only groundwater and precipitation contribute to water budgets of the lakes. **"What we've found is that the trees, soils, and groundwater in these two watersheds have a certain amount of buffering capacity.** Because rain water has to percolate a relatively long distance down to the water table through the soil at these sites, it may become buffered along the way," says Garrison.



Groundwater recharge picks up buffering capacity that counteracts acid rain as it seeps through soil and subsoil.

Garrison also says that the more groundwater that enters these lakes as opposed to surface runoff or direct precipitation, the less likely it is to be affected by acid rain.

East Eight Mile Lake, whose total water input is largely groundwater, therefore, is less susceptible to the effects of acid rain than is Round Lake.

However, lakes in northern Wisconsin whose annual water input comes largely from rain and snow are the most susceptible to acid rain, because they don't have the same amount of buffering from trees, soil and groundwater.

It is hoped that Wisconsin has time to consider alternatives to the acid rain problems before there is wholesale damage to our more sensitive aquatic resources.

Research and informed public go together

Madison — The director of DNR's Bureau of Research, Kent Klepinger calls this issue of Research News the first in what will be an ongoing series of reports to the public detailing activities of his bureau in its efforts to find out more about how to protect the environment and improve natural conditions for fish and wildlife.

Klepinger said work now being done by researchers in water resources, fisheries and wildlife is especially important because of today's increasing pressures on the environment.

"Research can find out how to raise natural production of fish and wildlife to meet heavier demand, can determine the requirements of nongame and endangered species to prevent their destruction, and discover ways to allay the detrimental effects of industrial, agricultural and urban development," said Klepinger.

Kent Klepinger

The research chief called the work of his bureau vital to the state's outdoor and environmental future and added that keeping the public informed of research activities is just as vital as the work itself.

Six years to reestablish food chain

Rice Lake — It took six whole years to reestablish a complete food chain after it was destroyed in a rechanneled portion of Bear Creek in Barron County according to DNR's Water Resources Research Unit. DNR conducted a study for the Department of Transportation after about 850 meters of Bear Creek was relocated in 1977 to make way for Highway 53. "The new 790-meter channel meandered through an unforested area, so very little leaf litter fell to the channel bottom," says Water Resources limnologist Richard Narf. This condition as well as other factors delayed recolonization by various species.

Before a food chain can be re-established, organic matter such as leaf litter and other material must collect between rocks on the channel bottom. Not only did Bear Creek lack such inputs, but its substrate went through a "sandy" phase in which sand filled in spaces that would otherwise have been occupied by organic particulates. Also, the channel had no fallen trees, snags, pools, or riffles to catch and retain matter that dropped into the water.

"The channel's sandy, nutrient-poor substrate prevented insects from moving upstream. Consequently, the area above the channel lost species diversity as well," says Narf.

It was two years before sand had cleared and enough organic matter had accumulated to support a partial food chain. Insects appear first. Not until 1983, six years after rechannelization, was a complete food chain in action in the channel.

Wisconsin tops in trout stream research and management

Madison — DNR trout management techniques developed by research have doubled, even tripled the long-term abundance of trout in many streams according to trout research group leader Bob Hunt.

Said Hunt, "DNR is now preeminent nationwide among natural resource agencies responsible for managing trout waters."

According to Hunt, DNR research biologists have contributed both to the success of the technical aspects of trout habitat improvement and the widespread support for such management among trout anglers.

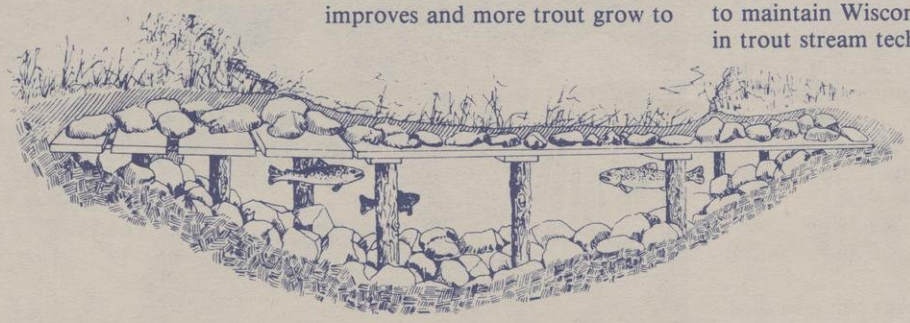
One of the most effective structures pioneered in Wisconsin is the bank cover-current deflector. It can remodel the channel of a trout stream and boost trout populations 100 to 300%. Two case histories based on many years of careful research are those at Lawrence Creek and the Big Roche a Cri in central Wisconsin.

The technique of adding half-logs to portions of streams deficient in hiding cover produced an increase of more than 500% in the number of brown trout over 10 inches on the West Branch of the White River. A half-mile of fertile trout water that was rarely fished prior to installation of half-logs was transformed into a highly attractive reach of stream for angling.

Research found that removal of dense, woody streambank vegetation along small streams stabilizes eroding banks with a rich growth of grasses that withstand undercutting and produce pools and hiding cover for large trout. Production of aquatic food is also enhanced and trout grow faster.

"Brush bundles" installed in wide, shallow reaches of streams are another technique research developed to improve living conditions for trout. Although the functional life of such bundles is only a few years, studies show positive short and long-term consequences. In the short haul, young trout are given more hiding and resting cover by the network of interlacing branches. Summer and winter survival improves and more trout grow to legal size the following year. Brush bundles also collect silt, sand and organic debris. This gradually reduces their value as cover for small trout but increases their capacity to channelize stream flow. The long-term consequence is more bends in the channel, greater depth and more pools.

"Technological competence such as this translates into more enjoyable trout fishing for thousands of Wisconsin anglers each year, and the assurance that good fishing will be there to enjoy in the future," said Hunt. He promised an ongoing effort to maintain Wisconsin leadership in trout stream technology.



Bank cover structures can boost a stream's long term abundance of trout by 100 to 300%. Drawing by Jim McEvoy

Water chemistry and cover are focus of pheasant—waterfowl study

Baldwin — DNR Wildlife and Water Resources Researchers have started a joint 10-year study to increase waterfowl and pheasant populations in the pothole region of Polk and St. Croix Counties. **The study will try to find ways to improve nesting cover and determine which biochemical features of ponds are critical for healthy waterfowl populations.**

The study area comprises 7000 acres of federal, state and privately owned land. The US Fish and Wildlife Service is also part of the project.

"We've experimentally manipulated the physical environment in a variety of ways to improve grass quality," said Wildlife Researcher James O. Evrard. Some of the less desirable quack and timothy grass areas were burned using controlled burning techniques. Near residential areas, grass was mowed rather than burned.

"The state has planted a lot of switchgrass, and because it is tall and dense we hope it will keep skunks and raccoons away from nests," said Evrard.

Landowners in the area are encouraged to use farm practices that improve nesting cover and provide winter food for ducks and pheasants.

Wildlife researchers are also experimenting with a "high intensity-low duration" grazing system that could support more wildlife as well as more cattle. In this system, a field is sectioned off into small areas, and cattle occupy one small section for a short time rather than the entire area for a long time. "The cattle are moved before they eat all the grass, usually when 80 percent of the plants remain," says Evrard. This way, grass can recover and support other wildlife before cattle graze the area again.

"Our job, in combination with the wildlife upland study, is to determine which biochemical features of the ponds are critical for healthy waterfowl populations" says Richard Lillie, co-project leader.

In the spring of 1983, Lillie began testing 17 potholes in Polk and St. Croix counties. "We're looking not only at lake and marsh water chemistry but at the phytoplankton, zooplankton, macrophytes, and at the invertebrates waterfowl eat," explains Lillie.

The limnological data is a critical part of the joint study.

Keeping track of water chemistry and water levels serves as a control for the wildlife research. A slight variation in oxygen levels or alkalinity might explain changes in the waterfowl food web not obvious in the upland study.

Carp removal attracts ducks to Grand River Marsh

Montello — From 1977 to 1981, DNR's Wildlife Research Unit studied duck breeding success on the Grand River Marsh in southeastern Wisconsin between Marquette and Green Lake counties.

"After carp were removed from the Grand River Marsh, the number of breeding ducks attracted to the marsh doubled," says William E. Wheeler, Wildlife researcher at Horicon.

In 1979, two years into their five year study of duck nesting success and overall duck production on the marsh, Wildlife Researchers noticed that a large carp population was destroying the submerged plants ducks feed on. Carp stir up bottom sediments and make the water cloudy so that plants and consequently invertebrates struggle for survival. Carp also compete with ducks for these food items.

DNR drained the main impoundment or reservoir on the Grand River and treated the fish with rotenone. One million pounds were removed. Submergent vegetation improved as did the invertebrate and duck populations.

Research News

Taking eggs doesn't hurt

Woodruff — "Taking eggs from walleyes for fish hatchery use has no detrimental effects on walleye populations in lakes," says Steven Serns, DNR Fisheries researcher at Woodruff. Serns studied the effects of egg removal on the walleye population in Escanaba Lake in Vilas County from 1979 to 1983.

The project analyzed how egg removal affected the fingerling population as well as the survival and reproductive success of female walleyes.

"We found that the average density of fingerlings per acre was 28 during the years before the study. "This fingerling density stayed the same throughout the four years we were studying egg removal," says Serns.

Spawning crews removed eggs from an average of 18% of the females in Escanaba Lake each spring, and the stripping did not affect their survival. "The mortality rates of spawned walleyes were the same as those of unspawned walleyes of the same age," says Serns.

On the average, artificial spawning takes only 44% of the eggs within a walleye's ovaries. The fish then apparently deposit all but one percent of their remaining eggs in the lake. Researchers compared stripped and unstripped walleyes in anglers catches and found a residual one percent in both.

The five-year study also revealed that egg removal does not decrease the ability of a walleye to produce viable or hatchable eggs. "Eggs taken from previously stripped females hatched in the same percentages as those eggs taken from walleyes of the same age that had never been stripped," says Serns.

Baby Lake Winnebago sturgeon

A long way from home

Oshkosh — DNR fishery researchers are currently studying the early life history of the lake sturgeon in the Lake Winnebago system. **"We've determined that the stretch of the Wolf River from the Shawano dam to 28 miles downstream is the vital habitat for the lake sturgeon's first year of life," says James Kempinger, sturgeon researcher.**

Begun in 1981 and continuing through 1985, the field sampling is the first dealing with young-of-the-year rather than adult lake sturgeon. Fishery researchers are monitoring timing and extent of egg deposition, hatching and downstream movements of fry as well as the habitat and growth of fry, fingerlings, and juveniles.

Male sturgeon mature at 15 years and females at 25 years. In April the adults migrate 121 miles up the Wolf River to spawn over the boulders beneath the Shawano dam. **Fry hatch about seven days after the eggs are deposited. Habitat of the 28 miles below the spawning grounds where young sturgeon spend their first year of life consists primarily of sand and pea-size gravel.**

Since the Lake Winnebago system supports one of the few lake sturgeon fisheries in North America, protection of the rearing habitat as well as the spawning grounds is crucial for the species' survival in Wisconsin.

Fertilizer gets rid of blue-green algae

Madison — Although nutrients in lakes dominated by blue-green algae are superabundant, water analysis usually shows low concentrations of inorganic nitrogen. Using this fact as a guide, DNR's chief limnologist, Richard C. Lathrop added ammonium nitrate fertilizer to a small highly eutrophic lake in Dane county that had a history of heavy blue-green algae infestation. Lathrop treated 66-acre Indian Lake with fertilizer in both the spring and early summer of 1981 and 1982.

"The addition of nitrogen to a lake that already has too many nutrients would appear nonsensical to some people," said Lathrop. But he reasoned that if the onset of blue-green blooms results from lack of inorganic nitrogen necessary to maintain other more desirable forms of algae, the addition of nitrogen should produce a dramatic difference in the dominant plankton.

And it did! The lake cleared up, good kinds of algae and zooplankton appeared, and the fish population increased. The effect, however, lasted only one year.

Lathrop is now in the process of further evaluating the lake fertilization experiment to determine nitrogen nutritional requirements of various algae and the overall usefulness of nitrogen fertilization as a lake management technique.

Electric fence boosts duck production

Madison — Electric fences around duck nesting sites might increase waterfowl reproductive success by keeping predators out of nesting areas. Last spring wildlife researchers fenced eight test plots totaling 155 acres in St. Croix, Dodge, Dane and Columbia Counties. The fences were designed to keep skunk, raccoon, and fox away from the mallard and blue-winged teal that breed on these public lands. **"This technique was especially successful at one of the plots in Dane County where 75% of the ducks nesting inside the fence were successful and only five percent outside were a success," says LeRoy Petersen, farm wildlife researcher.**

At other plots, results were less conclusive. Often small-bodied predators such as mink, ground squirrels and snakes were able to wriggle their way into the four-sided nesting area through the loosely-woven fence netting.

"We're trying to keep the larger predators out while allowing access in and out for the ducklings and chicks. Consequently, smaller predators get in through the three-inch spacings in the fence," explains Petersen.

DNR will maintain the electric fences for two more nesting seasons until the spring of 1985. "We're also considering tightly-woven three-sided fences with one side open to water. This way ducklings would have access to everything they need without leaving the nesting area," says Petersen.

Alum keeps lake from aging

Manitowoc — DNR researchers have found a way to improve the quality and slow down the aging of small lakes by treating them with alum.

Working on 65-acre Bullhead Lake in western Manitowoc County, Limnologist Richard Narf and a crew from DNR's Water Resources Research Unit injected alum into the lake's lowest water level, the hypolimnium. At the time of treatment in August of 1978, Bullhead Lake was on the borderline of overfertilization. It was sprouting blue-green algae which bloomed in pulses and looked ugly. Its fish tasted and smelled bad.

After treatment, blue green algae populations declined and were replaced by more desirable green algae and diatoms. Zooplankton and bottom organisms became more plentiful while observers reported better fishing.

Alum, which is aluminum sulfate, ties up phosphorous and keeps it out of the food chain.

"We thought Bullhead Lake was an ideal 'outdoor test tube' for alum treatment," said Narf. "The lake is small, landlocked, and receives virtually no agricultural or industrial phosphorous inputs."

Cost of the alum, which was delivered to the site in two large semi-trailer tank trucks was $2,500. Labor and equipment costs for application were an additional expense.

"We applied the alum in 1978 and the phosphorous level decreased after the lake's fall turnover in 1979," said Narf. The last tests were conducted in 1982 and showed the same reduced level of phosphorous as in 1979.

Narf said Bullhead Lake and its many relatives around the state are in the process of "self-destructing" because small amounts of phosphorous released into the water each year finally build up to eutrophic levels that speed up processes that create a marsh. He said the alum treatment, however, could artificially lengthen a lake's useful life, but pointed out that it is probably practical only in smaller lakes.

Marten reproducing naturally

Rhinelander — DNR researchers have confirmed that pine marten stocked in the Nicolet National Forest are reproducing naturally.

As of December 1 five unmarked marten had been trapped in the forest according to Forest Wildlife Researcher Bruce Kohn.

Since 1975 119 male and 49 female marten have been stocked in the Nicolet.

Researchers Kohn and William A. Creed and wildlife manager Ronald G. Eckstein began a live trapping program this year to determine if the animals have reproduced since stocking. The study will run until 1985.

Game managers use the presence or absence of ear-tags, lactation symptoms, and the age of a marten to determine if it is a stocked animal or if its an offspring. Each captured marten has its first premolar pulled and sent to the University of Wisconsin at Stevens Point for age calculation.

In 1953, five pine marten were placed on Stockton Island in Lake Superior's Apostle Island Chain. A small population was observed there in 1972.

A member of the weasel family, the pine marten or "American sable" is a rare predator today in the United States. Their thick tawny-brown fur makes them attractive to fur trappers. Even though Wisconsin closed the season in 1921, intensive logging, fire and agriculture had wrecked the marten's range. The last Wisconsin pine marten was taken in Douglas County in 1925.

200 bobcats per year limit

Rhinelander — A recent Wildlife Research study revealed Wisconsin's bobcat population has remained relatively stable since 1973. Objective of the study was to develop a system for monitoring statewide population trends and test track count surveys to determine bobcat abundance.

In 1973, declining populations and rising fur prices made it necessary to require hunters and trappers to register and tag bobcats. Using these registration forms, questionnaires sent to hunters and trappers, and the results of winter track counts William Creed and James Ashbrenner, Wildlife Researchers at Rhinelander analyzed bobcat harvest and population trends from 1973 to 1981.

During the period, 1,874 bobcats were taken, 838 by trappers and 807 by hunters with dogs. The remainder were taken by other methods, usually incidentally by hunters after other game. Biggest harvest came in the Northwestern part of the state with Douglas County accounting for 1778, Price 169 and Sawyer 154 bobcats. Data indicates that about 45% of all bobcat trapped were caught in traps set for coyotes. The track counts showed that bobcats prefer lowland conifer areas. Data revealed that sportsmen took an average of 208 bobcats per year. **Researchers recommended that, at least for now, the average annual harvest be held to 200 or fewer. They concluded that a two-month season and a one-bobcat limit are successfully limiting the harvest to 200.**

Once near extinct

2000 to 3000 fisher in Wisconsin

Rhinelander — DNR's Forest Wildlife research unit estimates Wisconsin's growing fisher population at between 2000 and 3000 animals. Researchers base this figure on a year long survey between July 1982 and June 1983 in the Monico Study Area of eastern Oneida County.

Previous surveys have shown that fisher have greatly expanded their range since the 1950's and 60's when they were reintroduced in Wisconsin. **DNR as well as trappers are interested in an experimental trapping season, and results of this ongoing study will determine if a season is biologically feasible.**

Wildlife managers live-trapped fisher as part of a population study by researchers Bruce E. Kohn, William A. Creed, and Dennis R. Lamb. **Using the mark-recapture method whereby fisher are caught, ear-tagged, released and caught again, researchers estimated the area held 28 fisher, or one per 2.6 square miles.**

The statewide figure of 2000 to 3000 was projected by relating fisher density to counts of 21 fisher tracks per 100 miles in the study area. Researchers counted tracks as they drove along road transects in the Monico Study Area after a snowfall.

Fourteen fisher were radio-collared to measure their movement patterns, home ranges, and habitat choices. Though details are still being interpreted, it was noted that home ranges of all 14 animals were within a 72 square mile area.

Historically, fisher were quite common throughout forested areas of Wisconsin. But by the turn of the century uncontrolled wildfire and heavy trapping led to their near extinction. Legal protection was given in 1921, but numbers continued to decline. Prior to restocking about 25 years ago, the last known native was found in 1932.

Hoarfrost

FRANK SECHRIST
Associate Professor of Meteorology,
UW-Madison

In anticipation of the change of seasons, John Muir once wrote: "I had long lived in bright flowery summer, and I wished to see the snow and ice, the divine jewelry of winter once more...."

For Wisconsin, winter provides a special variety of this Muir jewelry known as hoarfrost.

During long, clear, calm nights when chilly temperatures move southward the air cools to the dewpoint and is saturated with moisture. Subsequent cooling results in condensation which produces dew when the dewpoint is above freezing. But when the dewpoint is below freezing, the water vapor sublimates, or skips the liquid stage and is deposited as ice crystals on some cooling surface, be it a blade of grass, a leaf or an entire tree.

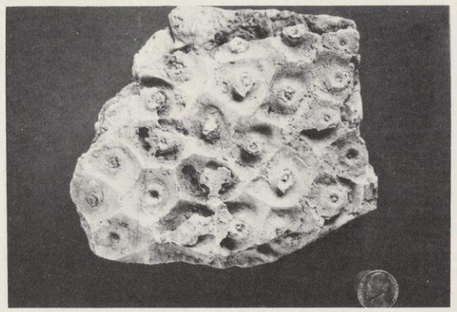
Frost tends to form initially and most copiously at edges and points because this is where the cooling rate is greatest.

Generally, there are two types of this kind of frost: columnar and tabular. The columnar (branch-like) occurs when water vapor is deposited rapidly at temperatures not much below freezing. The tabular (flower-like) on the other hand, is favored when temperatures are much below freezing and the deposition occurs relatively slowly.

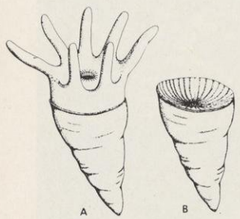
The lacy, plume-like growth on window panes is another form of hoarfrost which grows indoors. With extremely cold outdoor temperatures, windows may become so cold that the indoor water vapor exposed to them is deposited on the pane. These intricate and delicate patterns usually follow scratches and abrasions on the glass. Try scratching your initials on a pane and see the unique patterns that form around them.

Photo by Chris Mattison.

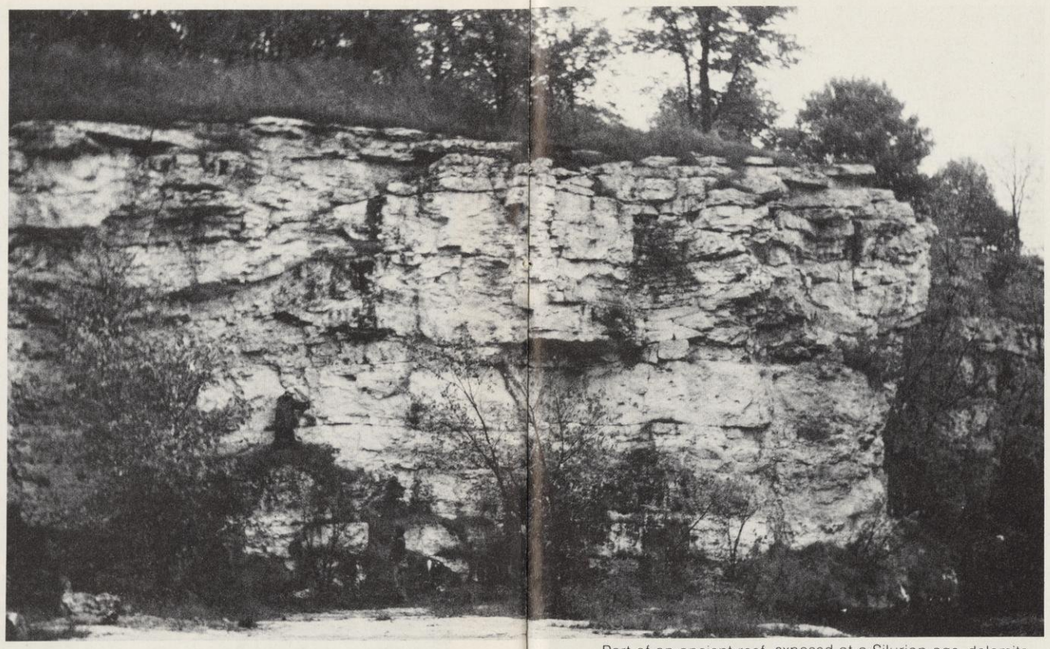
The "Chain Coral" *Halysites*. Top view. The individual tubes in which the polyps lived are linked together to form a chain-like pattern when viewed from above.
G. Gunderson Collection.



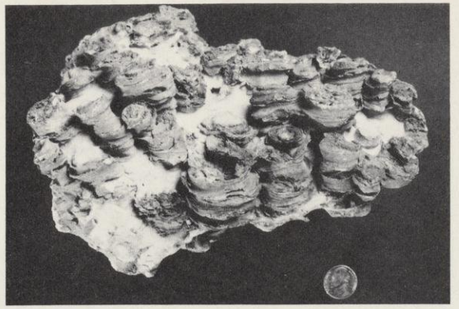
Arachnophyllum, a colonial Rugose Coral from the Silurian of eastern Wisconsin. Each of the six-sided areas housed one polyp.



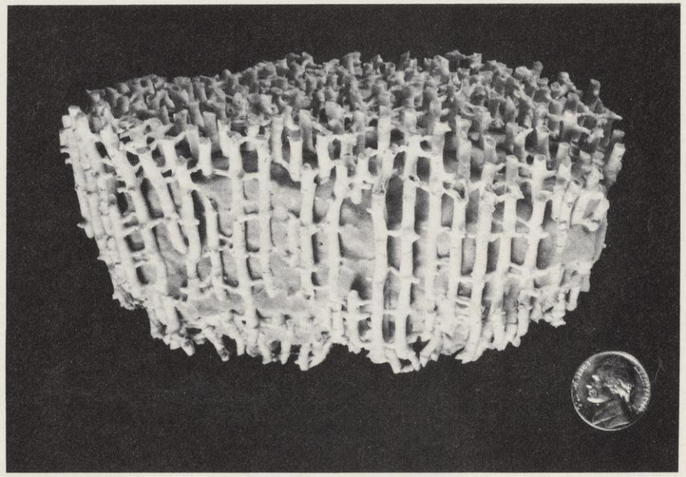
Solitary Rugose Coral. **A.** reconstruction showing the soft bodied animal (polyp). **B.** The calcium carbonate skeleton showing the radial septa which are a characteristic of the rugose corals.
Drawings by Susan Smith.



Part of an ancient reef, exposed at a Silurian age dolomite quarry at Quarry, Manitowoc County. The irregular layering in these rocks shows the structure of the reef.



Strombodes. The individuals in this colony of Rugose Corals are linked to each other by lateral connections. From Silurian deposits in Door County.



Fossil corals of Wisconsin

KLAUS W. WESTPHAL UW - Madison Geology Museum

About 400-million years ago a warm sea covered our state and beneath it were coral reefs that still exist.

Could you make your home at the ocean bottom among seaweed and shellfish? Or how about next door to a coral reef? Strangely enough, many people in Wisconsin actually enjoy such exotic surroundings. The seashells they're neighbor to, however, are several hundred million years old. The oceans that were home to many plants and animals have long since receded, the sandy or muddy bottom turned to sandstone, shale, limestone and dolomite as time passed.

Today, creek beds, cliffs, roadcuts and quarries expose layers of sedimentary rocks in eastern, southern, and western Wisconsin. These rocks are remnants of an ancient sea that covered all of Wisconsin and many neighboring states during the Paleozoic Era which occurred from 600 to 230 million years ago. Erosion has since stripped the land of much of its Paleozoic bedrock. The glaciers of the Great Ice Age have scraped the ground in all but the southwestern quarter of the state, grinding up the underlying rock and redepositing it as layers of sand and gravel. Much of Wisconsin's bedrock also lies hidden beneath soil and vegetation. If you keep your eyes open however, you can still spot good outcrops of Paleozoic rocks.

Geologists have divided the Paleozoic Era into several successive Periods. It was during the earliest, the Cambrian, which lasted about 100 million years, that a forerunner of the Atlantic Ocean spread all the way across the flat and barren Wisconsin landscape. The waters were shallow and clean, and alive with algae, snails, crawling trilobites and two-shelled brachiopods. These and other forms of marine life, were Wisconsin's first settlers, long before the vertebrates had evolved. In the succeeding Ordovician Period, 500 to 435 million years ago, life in the oceans became increasingly diverse. Clams appeared for the first time, straight cephalopods—relatives of today's Pearly Nautilus—were found almost everywhere and corals made their debut.

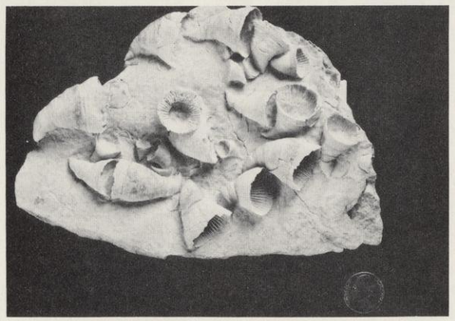
During the earth's long geological history the continents kept moving across the surface of the earth, gradually shifting position in relation to the poles and to each other. This process, which is still going on, is commonly referred to as "continental drift", or, more recently, "plate tectonics". The arrangement of the continents during Early Paleozoic times was such that the equator ran straight through North America, missing Wisconsin by a mere 500 to 1,000 miles.

The shallow ocean that covered our region was warm, therefore providing ideal conditions for the growth of coral. It was during the Silurian Period, 435 to 400 million years ago, that coral reefs developed in many parts of the world. Their remnants are found in Wisconsin's geological record in the eastern part of the state and continue south into Illinois. The corals formed a fringing reef that surrounded a depression in the sea floor, called the Michigan Basin.

Rock formations in Milwaukee provide evidence that Wisconsin was submerged during part of the Devonian Period 400 to 345 million years ago, but towards the end of that period the earth's crust was gradually uplifted by tectonic processes, and the land fell dry.

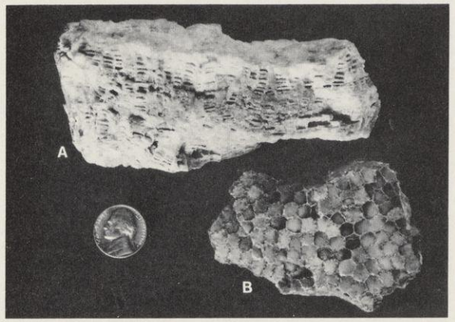
Corals and their relatives, the sea anemones and the jellyfish, are rather simple animals. Their sac-shaped bodies lack such complex organs as gills, a kidney, or a heart. The mouth is surrounded by tentacles with which the animal captures its prey. The coral animal, the polyp, secretes an external skeleton of calcium carbonate, which anchors the coral to the sea floor.

Two orders of extinct corals are found in Wisconsin's Paleozoic bedrock. The rugose corals are easily recognized by their radial partitions, or septa, that line the inside wall of their shells. The septa that reflect the polyp's anatomy give added

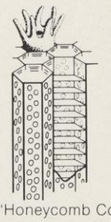


The "Organ Pipe Coral" *Syringopora*, a tabulate coral from Door County. The colony is held together by tiny crossbars.

Solitary "Horn Corals" of the genus *Streptelasma* from the Ordovician limestones of Beloit. The radial septa are clearly visible.



Favosites. **A.** Side view showing the tabulae. **B.** Top view. Silurian, eastern Wisconsin.



The "Honeycomb Coral," *Favosites*. Reconstruction with one polyp shown in drawing. The horizontal partitions (tabulae) are shown as well as the wall pores that characterize this genus.
Drawing by Susan Smith.

Photos courtesy of the UW-Madison Geology Museum.

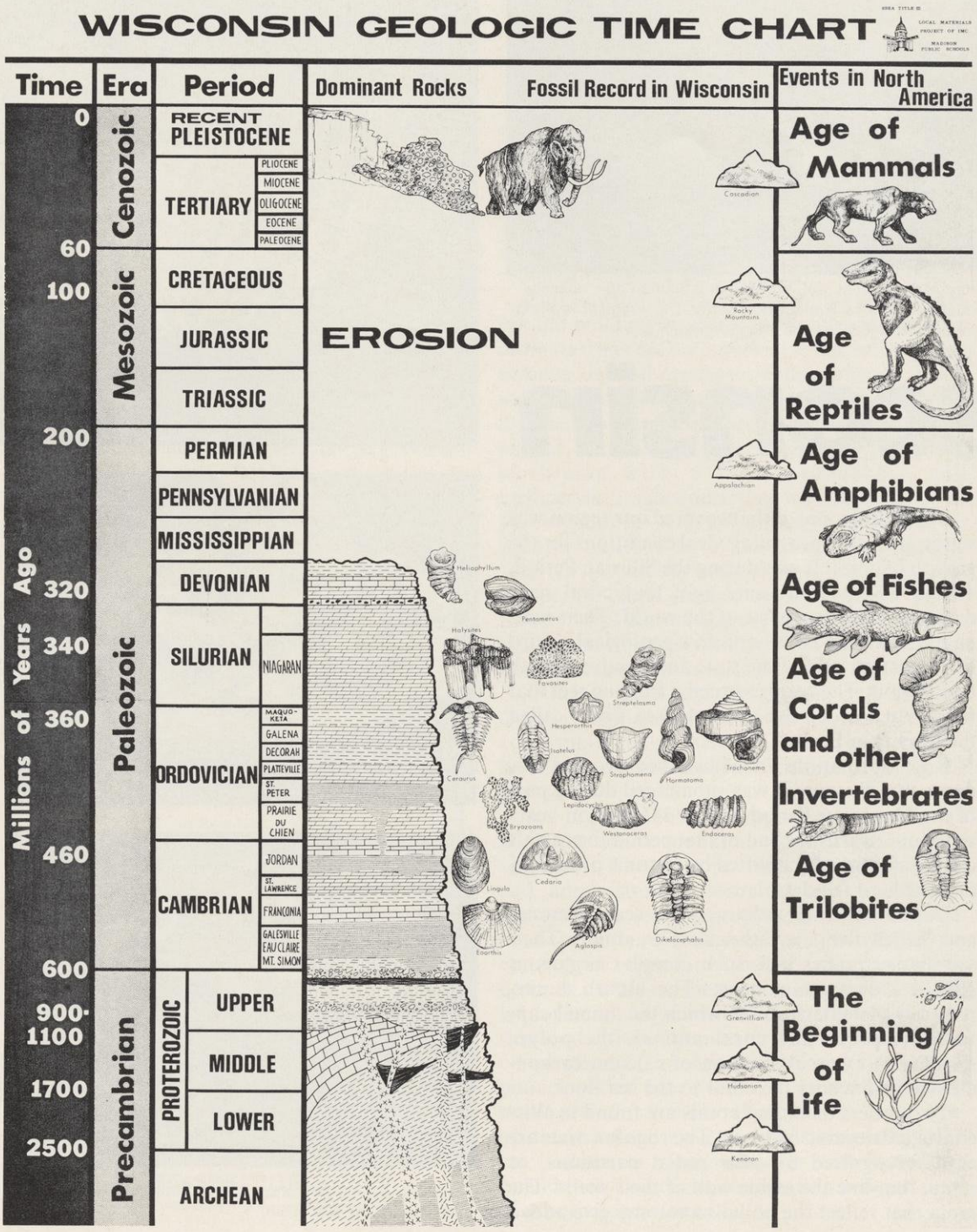
strength to the skeleton. Some rugose corals secrete individual, cone-shaped skeletons, for example, the "horn corals," such as *Lambeophyllum* and *Streptelasma*. Others combine to form colonies such as *Arachnophyllum* and *Strombodese*.

The tabulate corals are characterized by their lack of well-developed septa. The individual housing, or corallites, are usually long and slender, and rarely exceed a few millimeters in diameter. As the colony grows upward, the animal moves up, "adding on" on top, and sealing off the vacated portions underneath with a successive series of horizontal partitions called tabulae. Such tabulae are also found in certain rugose corals in addition to their radial septa. Common tabulate corals are the "Organ Pipe Coral" *Syringopora*, the "Chain Coral" *Halysites*, and the "Honeycomb Coral" *Favosites*.

Corals are part of Wisconsin's geologic heritage. Excellent collections can be seen in museums around the state, and in many private collections, but the best place to find them is in their natural homes, the bedrock formations of our state.

Most specimens shown here are on display at the Madison Geology Museum, 1215 W. Dayton St., Madison, WI 54706.

Chart courtesy of the Wisconsin Geological and Natural History Survey.



Cold hands, warm heart

An unprotected head can lose up to half the body's heat production at 40 degrees Fahrenheit and 75% at five degrees.

JOSEPH G. NEUWIRTH, Ph.D.

The physics and physiology of why you get cold and what to do about it.

Regardless of your personal taste in clothing, the primary concern of most people outdoors is to keep comfortable. Going beyond this point to worry about survival is rarely considered. You can easily assume you will never be at risk and thus never adequately prepare. However, everyone who uses the outdoors should know how the body reacts to cold and what to do to achieve heat balance in a cold environment.

Although there is considerable difference in how individuals react, survival in the cold depends primarily on physiological well-being and use of protective clothing.

There are two kinds of anatomical responses for maintaining body temperature in a cold environment: those that decrease heat loss and those that increase heat production. The first is a complex physiological sequence which decreases the volume of blood circulating near the surface of the body. Neural feedback from skin temperature receptors triggers constriction of blood vessels near the skin. This in turn decreases heat transfer from the inner core of the body to the surface and ultimately decreases heat loss to the air. In the second, voluntary muscle action or the involuntary act of shivering accelerates metabolism and produces greater heat. Together, these responses seek to prevent a decrease in body temperature and maintain it within the narrow limits required for normal functioning.

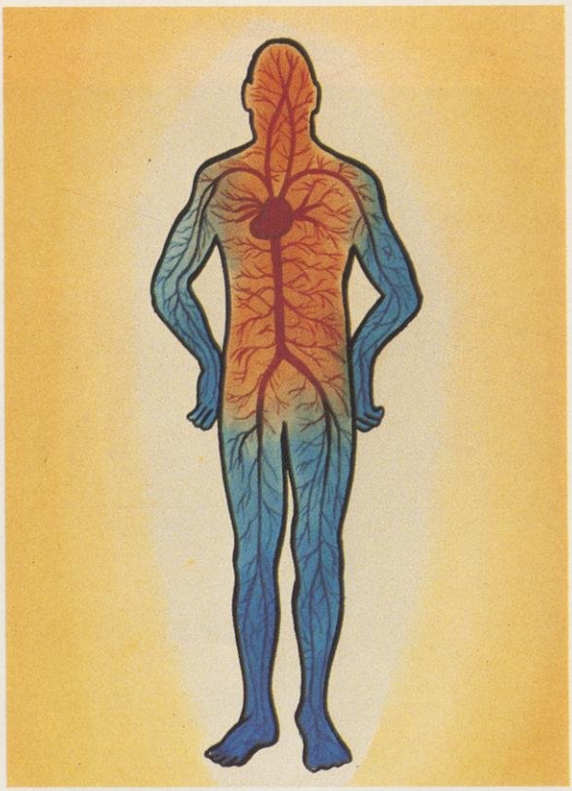
One uncontrollable variable affects the body, the cold itself. A person may be subjected to cold in still air, wind, dry air or wet and all combinations of these. The particular nature of each combination affects the heat transfer and, hence, the method of control. For example, a moderate wind during the warm months is often quite refreshing

but in the cold season can range from uncomfortable to disastrous. Wind rapidly removes heat from parts of the body with insufficient protective covering.

Thermal conductivity of water is about 24 times as great as that of dry air. This means humid air is a much greater conductor of heat than dry air at the same temperature. If clothing becomes wet, either from the outside air, rain, melted snow or perspiration, heat is transferred from the body as much as 24 times faster than with dry clothing. Whether moisture given off by the body is evaporated depends on the amount of moisture in the outside air, i.e. the relative humidity. If the relative humidity is 100%, the air cannot receive transpired body moisture and it condenses in the outer layers of the clothing. Moisture condensation within the clothing may also occur because of cooling in the insulating layers. The colder the air, the less evaporated moisture it can contain.

The two primary environmental factors that determine the degree of heat transfer from the body are wind and moisture. Their effects are felt regardless of the amount or the type of insulation used to cover the body.

Neither temperature nor wind alone are a good index of how cold it feels. The wind-chill index used by many government agencies represents the relative comfort of an inactive individual in dry air conditions. It combines actual ambient temperature and wind velocity into an equivalent still air temperature. However, the wind-chill index is only an approximation. The actual level of comfort or discomfort will depend on other variables such as relative humidity, degree of sun exposure, type and amount of clothing and physical condition of the person involved.



Heat is a form of energy produced by the body as a result of food consumption. First, foods are digested, then absorbed, and finally metabolized. Metabolism is the chemical change absorbed foods undergo within the cells which allows the body to sustain itself. The rate of total energy production, and also consumption, depends on many things, including the size of the individual and the degree of activity. The normal physical and chemical processes which sustain life in an inactive person consume energy at the rate of about 80 calories per hour or 2,000 calories per day. The total energy consumption would be this amount plus the additional energy used in muscular work. Depending on the degree of activity, total energy requirements may vary from 2,000 calories to over 5,000 calories per day. Only 18% to 22% of ingested food is converted into mechanical energy. The rest is liberated as heat. This heat is produced in all tissues of the body but primarily in the skeletal muscles. Even during rest, these muscles have a large energy requirement, which during work is increased enormously.

For about four hours following a meal, food is digested and absorbed into the system. During this period, carbohydrates are the major source of energy. Only a very small amount of the absorbed protein and fat is similarly utilized. The fraction of protein and fat not used to rebuild tissue structure and the amount of carbohydrates not used for energy are transformed into fat and stored in the body tissue. After absorption, energy requirements must be met from internal stores by transforming body fat.

Since we normally eat three meals a day,

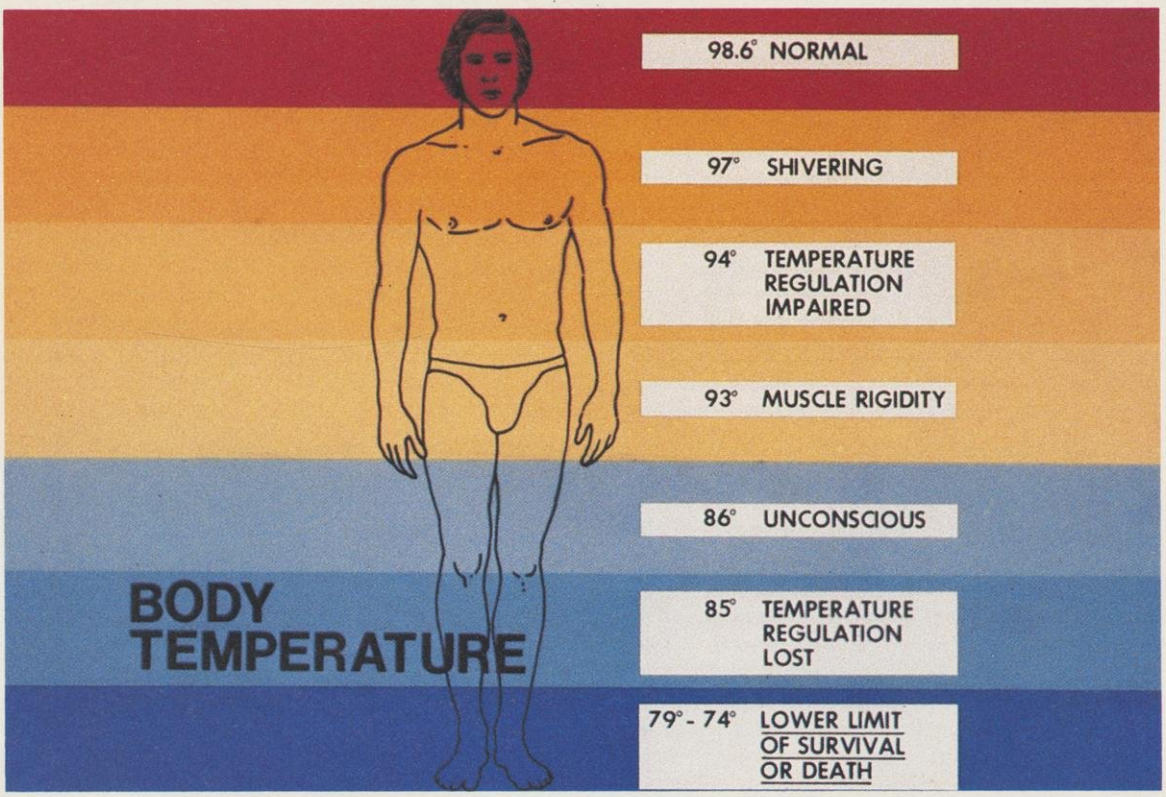
Survival Equipment

Prepare your own survival kit, and know how to use it. Carry it at all times. It does little good if left in your vehicle.

Below is a list of items to be included in a survival kit. Prescriptions and other individual requirements should be considered.

1. Matches (in waterproof container).
2. Fire starter, such as sawdust soaked in paint thinner, 0000 steel wool, cotton balls, cigarette lighter, commercial fire starter. Carry at least two ways to start a fire.
3. Metal match or flint and steel.
4. Candle.
5. First aid kit.
6. Spare general purpose knife.
7. Compass and topographic map.
8. Quick energy emergency food.
9. Water.
10. Space rescue blanket.
11. Eight-foot square of plastic.
12. Fishing tackle.
13. Surgical tubing (3-4 feet).
14. Whistle.
15. Signal mirror.
16. Nylon cord or rope.

Other items to consider include spare prescription glasses (if needed), sunglasses, chap stick, flashlight and or chemical light, safety pins, flares, needle and thread, duck tape, snare wire, plastic bags, water purification tablets, spare socks.



Far left: When temperatures drop, vasoconstriction limits blood flow to the extremities and keeps the body core warm. Flow to the fingers can drop by as much as 99%.

Symptoms of hypothermia become more severe as body temperature drops.

energy is derived directly from the food taken in. Of course, it is obvious where the energy must come from when there is no food to be absorbed — dieters are most familiar with this process.

Foods ordinarily are divided into three categories with the following caloric or heat equivalents: carbohydrates, four calories per gram; fats, nine calories per gram; and proteins, four calories per gram.

The body normally consumes available carbohydrates in preference to fats or proteins to fulfill energy demands. It uses fats or proteins only as secondary fuels when the carbohydrate supply becomes inadequate.

Heat production increases as a direct result of eating, but contrary to reason more heat is produced than the caloric value of the food intake. It comes from food reserves and is partly dependent upon the type of food ingested. Consumption of carbohydrates and fats result in an "extra" energy level of about 5%, while proteins produce an increase of up to 30%.

The point is that body heat is made possible by only one means — metabolism of ingested food. You must eat to live. You cannot cram down a doughnut and cup of coffee in the morning and expect to put in a 20-mile day on skis without feeling the effects of an inadequate fuel supply.

Our body surface exchanges heat with the outside by radiation, conduction, convection and water evaporation. To maintain a constant body temperature, total heat production must equal total heat loss.

Radiation is the direct exchange of heat energy between surfaces not in contact. There is radiant transfer from the body to clothing, to a tent or other shelter, to the cloud cover or to outer space. The rate of heat transfer depends on the temperatures of the surfaces and increases drastically as their difference increases. Radiation is a leading cause of heat loss under many conditions. The head and neck are most vulnerable.

Conduction is the direct transfer of heat from molecule to molecule. The body surface loses heat by conduction through direct contact with cooler objects, such as water, snow, metal and of course, air.

Convection is the process whereby air next to the body is heated, moves away and is replaced by cooler air in an endless cycle of circulation. It is greatly facilitated by the wind which continuously maintains a supply of cool air.

Heat is also lost by evaporation of water from the skin and respiratory tract. As moisture vaporizes from the body's surface, the heat required to drive the process is extracted from the body, cooling its surface. Even in the absence of sweating, there is a loss of water by diffusion through the skin. This transpired moisture amounts to approximately 20 fluid ounces per day in the average person and accounts for a significant fraction of total heat loss.

Although evaporation accounts for a substantial loss of body heat, little can be done to prevent it. Because of this, it is better to aid rather than hinder the process by wearing fabrics that breathe. If water vapor cannot pass through insulating fabrics, it condenses, wets the clothing and may even freeze, forming a complete barrier to moisture.

Physiologists view the body as a central, heat-producing core, surrounded by a layer whose insulating capacity can be varied to maintain the core temperature at approximately 99 degrees

fahrenheit. If the skin were a perfect insulator, its outer surface would equal the environmental temperature and there would be no heat loss from the core. The net heat transfer, due to conduction, convection or radiation would then be zero. The skin, of course, is not a perfect insulator and the temperature of its outer surface generally lies somewhere between that of the surrounding external environment and the inner core.

The skin's effectiveness as an insulator varies with the amount of blood flow which diminishes the insulating capacity of the skin by carrying core heat to the surface. The more blood that reaches the skin from the body's core, the more closely the skin's temperature approaches that of the core and the more heat lost.

With exposure to cold, just the opposite happens. Skin blood vessels constrict, reducing blood flow toward the surface and making the skin a more effective insulator. This vasoconstriction reduces skin temperature and the rate of heat transfer. The lower limit is the point at which maximum skin vasoconstriction has occurred. Any further drop in the environmental temperature causes excessive heat loss. At this point the body must increase heat production to maintain its temperature balance. Vasoconstriction may make the skin on the fingers undergo as much as a 99% reduction in blood flow during exposure to cold. While protecting the body's core, this phenomenon is sacrificial in nature. The extremities become extremely susceptible to frostbite.

Vasoconstriction, however, is physiologically impossible in the head and neck region. Because this area contains many blood vessels near the surface yet close to the heart, it is a tremendous heat exchanger. Special attention to control heat transfer here is vital. An unprotected head may lose up to one-half of the body's total heat production at an environmental temperature of 40 degrees fahrenheit and up to three-quarters of total body heat production at five degrees fahrenheit.

While considering vasoconstriction and vasodilation, something should be mentioned about tobacco and alcohol.

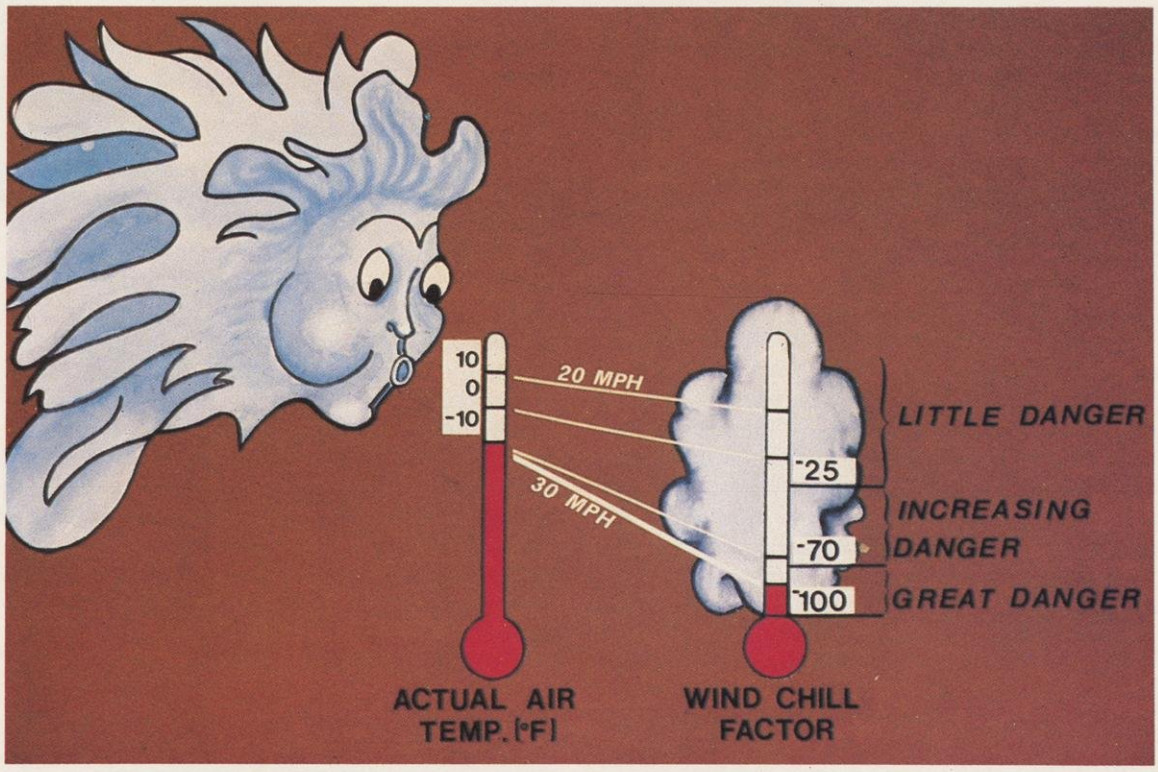
Nicotine produces vasoconstriction in the extremities. This can cause a skin temperature drop of as much as 10 degrees for the fingers and toes. The effect is temporary and depends on the individual involved.

Alcohol in moderate amounts produces vasodilation in the extremities, just the opposite of smoking. It also affects the heat center in the brain, causing a small but significant core temperature drop. This decrease is rarely realized consciously, because a peripheral vasodilation produces a simultaneous feeling of warmth in the extremities. The result is a chilling of the peripheral blood and an ultimate decrease in body temperature.

Thus, both tobacco and alcohol are detrimental to proper control of body temperature. In view of their effects on circulation, not to mention the more obvious physiological reactions, abstinence, or at least moderation, while engaged in winter wilderness travel would be advisable.

The body can increase its heat production only through muscular action, either voluntary or involuntary. Either method assumes that there is sufficient fuel supply to support such action.

In adapting to extreme cold, the body produces heat by a gradual overall increase in skeletal muscle tension, culminating in shivering, which may continue for the entire duration of exposure or until the available energy is expended and exhaustion results. Since the muscle contractions produced by shivering produce no external work, the



In addition to wind chill, other factors such as relative humidity, degree of sun exposure, type of clothing and physical condition all affect outdoor comfort.

energy consumed appears as internal heat. Intense shivering produces heat approximately equivalent to walking at a fast pace. It is nevertheless to be avoided. Shivering is a way the body cries "Help!" in a last-ditch effort to maintain normal inner core temperature.

When skin temperature falls low enough to cause numbness, touch perception and pain sense is impaired. The agility of limb muscles is decreased, and it becomes difficult to perform coordinated movements. This phenomenon, technically known as hypothermia and commonly referred to as exposure occurs if heat loss is allowed to proceed unchecked.

As the body's inner core temperature begins to drop below 99 degrees the first indications of hypothermia appear. Shivering begins and there is difficulty in performing precise tasks. Loss of alertness and impaired speech follow with continued decrease in temperature. The victim ultimately becomes completely irrational and lapses into a state of unconsciousness. The chances of anyone helping himself out of such a perilous situation are obviously very small. Rescue and immediate attention are necessary for survival.

An important mechanism for altering heat loss is changing surface area. Everyone has watched a dog curl into a ball when resting in the cold. The same principle applies to man, who can draw his knees to his chin, hunch his shoulders or perform other maneuvers to reduce the surfaces exposed to the cold.

Clothing is the single most important component of heat regulation. The principle is simple. The outer surface of the clothing now becomes the true exterior of the body. Again, surface area is of prime importance. The value of increasing the thickness of insulation around an object is limited, since heat conduction is proportional to surface area. As the thickness of the insulation around a cylindrical or almost cylindrical object (arms, legs, torso) increases, the surface area through which heat can be lost also increases by the same amount. This results in an effective decrease in the heat retaining value. For example, to double the value of an insulating layer one inch thick, it is necessary to increase its thickness to almost three inches.

This relationship demonstrates the difficulty of insulating an inactive person in a cold environment. For example, no thickness of insulation, regardless of type, is sufficient to keep the hands warm indefinitely under certain conditions even when the rest of the body is adequately warm. The only way to maintain warmth in this case is by placing the hands next to the torso or under the armpits. The insulating ability of clothing is determined by its type, thickness and the volume of air trapped within and between the clothing layers. The skin loses heat directly to the air trapped by the clothes. The clothes in turn transfer the heat from the inner air layer to the outer environment.

Sweating in a cold environment destroys the heat retaining value of insulation. Water is continuously secreted through the skin. Some of the water evaporates at the skin surface, which requires body heat. This water vapor migrates toward the outer surface of the clothing until it reaches a layer whose temperature causes it to condense, wetting the clothing and losing the heat that had kept it vaporized. The condensed water now migrates back toward the skin by a wicking action, only to be recycled by a similar process all over again. This is why insulation must be able to breathe. Body moisture must be disposed of, but without overloading the insulating layers of clothing with water.

Water accumulation in clothing is hard to control. The destructive effects are best avoided by providing adequate ventilation during exertion and by drying garments at every opportunity. Open all zippers during exercise and close them during cool-down. Another way is to wear several thin layers of clothing so that one or more can be removed as heat is produced during exertion. Regardless of the method, it is best to remain on the cool side of comfort to minimize the chances of sweating. The cardinal commandment of cold weather adaptability is, "Be warm but don't sweat."

Ignorance often makes people overreact in the face of danger. The usual tendency is to fight the natural elements rather than adjust to them. For precisely this reason, many people have lost their limbs and their lives while engaged in potentially uneventful winter wilderness adventures. So make sure you know what to expect and how to cope with the unexpected. This knowledge can spell the difference between a rewarding experience and a flirt with disaster.

The cold facts of life

1. The source of energy in your body is the energy contained in ingested food.
2. You must eat to live. So count calories with your proposed task in mind when preparing for a trip.
3. Food intake equals internal heat production plus any external work performed.
4. When you are cold, your body strives to produce additional heat by shivering even if you are starving.
5. Your ability to survive in the cold depends primarily on a calculated use of protective clothing for controlling the loss of heat from your body.
6. Regardless of the source of moisture, if you become wet, heat may be transferred from your body up to 24 times faster than if you were dry.
7. Keep warm, but don't sweat.

Six Rules of Survival

Remember these rules:

1. Tell someone where you are going and when you plan to return. Tell someone if you change your plans.
2. Never go on an outing by yourself.
3. Take enough food for several days for possible emergency use.
4. Take a compass and map of the area and know how to use them. Orient yourself to the map before leaving camp.
5. Wear proper clothing and equipment.
6. Return to camp before dark.

Birding with a Purpose

Chapter 19

Have you seen a little girl?

FRANCES HAMERSTROM

Here is a chapter from a new book, *Birding with a Purpose*, by Frances Hamerstrom, who along with her husband, Fred, conducted research that saved the prairie chicken in Wisconsin. This is an account of her adventures with other birds. The foreword says her book "consists of behind-the-scene recollections of a raptor-trapper named Fran. She does not pronounce it Fran as in brand.....but Fron as in Frond—the way they do in Back Bay, her point of origin in this life."

Reprinted by permission from *Birding with a Purpose: of Raptors, Gabboons, and other Creatures* by Frances Hamerstrom © 1984. Iowa State University Press, South State Avenue, Ames, Iowa 50010. Tentative price: $13.50.

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Flashlights seemed to start blinking all over the barn as starlings, pigeons and sparrows flew to the lights.
Drawing by Artist Eric Weaver.

An Ancient Indian bird trapping device, the bal chatri or boy's umbrella was modernized for raptor research.
Drawing by Jack Oar.

Little by little I learned more about the Rockford Bunch. Their lives were dominated by birds of prey — at the expense of schoolwork, normal good manners, and creature comforts. And they almost always forgot to bring any food along. Even when they went to trap at Cedar Grove Ornithological Station, they failed to bring food. (Dan) Berger and (Helmut) Mueller simply suggested that they camp atop a bluff by Lake Michigan for they had not yet earned the right to trap at the station.

Camp on top of the bluff they did . . . in an abandoned cemetery . . . which abounded in wild asparagus. They picked asparagus and because water from the lake was a long way down, they cooked it in beer — with which they had not failed to provide themselves.

Not long after this episode, when I was trapping at Cedar Grove, the Rockford Bunch said they needed me to go bait-catching.

"Why me?"

"You can get us into the barns. We need somebody like you."

I looked them over and could see the farmers' viewpoint. If I were a farmer, would I let a group like that into my barn?

"The Hamerstroms trap their bait birds. Why don't you?"

I had expected the answer to be that they had forgotten or some other weak excuse. Tom answered, "Trapping is too slow."

Too slow! If this bunch had discovered a method of getting bait more quickly than trapping, nothing would deter me from learning it.

"I'll come."

These natural con artists piled into my car. Frank usurped the driver's seat and off we went into the night at a rate that I found alarming, until I noticed that he was an excellent driver.

Soon we drove into a farmyard. "You ask."

I knocked on the door and turned to look at the car while I was waiting. There appeared to be one person in the car; the other five were out of sight!

Plainly it was easier to get permission for two people to get into that barn — and one of them a female.

"Good evening. You have starlings roosting in your barn. We'd like to catch them."

The farmer, thin-necked and bald, scratched one of his very large ears. "Don't know as I want anybody around in my barn at night."

"Starlings," I added firmly, "mess up the hay and they have been known to carry hog cholera."

"Huh?"

"We would be very glad to take the starlings away for you."

The farmer said something I couldn't understand at all — a sound rather like um-ka-huh.

I didn't dare ask what he said, so I said, "Thank you very much."

Uneasily I waited for his answer. It came clear and distinct. "I hope you get them all."

As soon as I got down the porch steps, he turned out the yard light. I didn't think it very polite of him.

At that time I hadn't learned that yard lights (and full moons) are a menace, enabling the birds to find and fly out the windows before they can be caught.

Joyously, in the dark, I fumbled my way back to the car. Jack gave orders for my benefit. "Everybody is to climb as high and fast as he can. Nobody uses a light till I use mine."

The architecture of Wisconsin barns varies only slightly, but it is best studied in daylight. I followed the sound of pummeling feet past a long line of cows, scrambled up a ladder to the loft and then followed the clink of somebody's boots on the loft floor until I could grab another ladder. Swiftly I swung up the ladder for about 12 feet where I bumped my head. Two planks were in my way, but a rope was handy to get past them and continue up the ladder.

Feeling that I had lost time by stupidly bumping my head, I climbed full steam until I received a kick on the jaw from a cowboy boot. Much shaken I stayed right where I was until I could see Tom slide a leg over a high window sill to get into catching position. I made for the other window and flashlights seemed to start blinking all over the top of the barn. Starlings, pigeons, and sparrows flew to the lights. Tom had arranged his light so that he had both hands free and was grabbing birds out of the air and stuffing them into a bag at his belt.

Nobody had thought to give me a bag, so I took off my socks and stuffed starlings into them

and simply deposited pigeons in my pockets and inside my shirt.

"Who'll shake the track?"

Raymond yelled, "I will!" and soon even more starlings, startled by the racket and their jiggly substrate, flew toward the lights.

Suddenly it was all over. Somebody shouted, "Let's leave the rest for seed." I was the last one down out of the barn and when I got back to the car everyone was sitting very quietly. We drove out of the driveway and parked on a hilltop to count our catch.

Twenty-three starlings, five pigeons, and four sparrows. "Pretty good."

"Fran, how did you get us into that barn. He always says no."

"Hog cholera."

"What?"

Using the silly simper that Jack uses when he is being especially annoying, I asked, "Don't starlings carry hog cholera on their feet?"

These people never applauded. Approval was demonstrated by loud roars accompanied by beating on the chest.

Much relieved that the foray had been a success, I longed to get back and crawl into bed where Frederick was waiting for me. But a conference was underway.

"We have almost enough."

I wondered how far it was to warm blankets and sleep. This was but a vain dream.

"We need to take just one more barn."

To my relief, Raymond said, "We'll never get permission if we wake anybody up. The farmers have all gone to bed."

But Frank had another idea. "I know a barn that's sort of far from the house. They'd never know we was there."

It was my car, but I wasn't consulted. We went roaring off across the countryside, parked the car on a main highway, and traipsed up a bank in the darkness to a huge and ancient barn.

"No lights!" came an abrupt command. I flicked off my flashlight and stumbled along with the others in the darkness.

The moon appeared for a moment and the gaunt old barn gleamed silver. I found it beautiful but Frank sputtered, "Damn!"

Moonlight could undo our undertaking.

This barn was easier for me because I knew what to expect now. The crew scrambled high onto small platforms by the windows. After I had worked my way to a high gap where night sky gave a faint light thanks to a missing board, I could hear traffic far below. It hummed on the highway.

Then lights seemed to shine from every corner of the rafters, and, bird after bird, we made our catch.

Just as I expected somebody to yell, "Time to shake the track?" Jack called "Lights out!"

The outside of the whole barn appeared to be surrounded by waving lights. Raymond, who was near me, hanging by one hand and reaching for some sort of a foothold whispered, "The cops!"

Trembling, not daring to shift position, I stayed motionless with a good handhold just out of reach. I could see police, with gleaming badges, shining their lights around the barn floor.

Jack stood alone near a decrepit wheelbarrow that someone had left near the big barn door. Strong police flashlights seemed to pin him to the spot. Then he spoke in a slightly worried tone.

"Have you seen a little girl?"

"Is she lost? Can we help you?" the police inquired.

Jack is slightly wall-eyed and has an engaging innocent face.

Above him we clung to our catching perches without a sound.

Jack kicked at a small pile of hay and answered easily. "I guess she's gone home."

The police departed.

We climbed down as quietly as we could from our high perches, slipped away to the car and drove off without unseemly haste.

About two miles down the road we felt safe. The yelling and thumping on chests started once more, this time reaching a strange savage rhythm, interrupted by chants of

"Have you seen a little girl?"

When I finally crawled into the sleeping bag, Frederick turned on some light.

"Good Lord!" he asked, "What's happened to your jaw?"

"Jaw?"

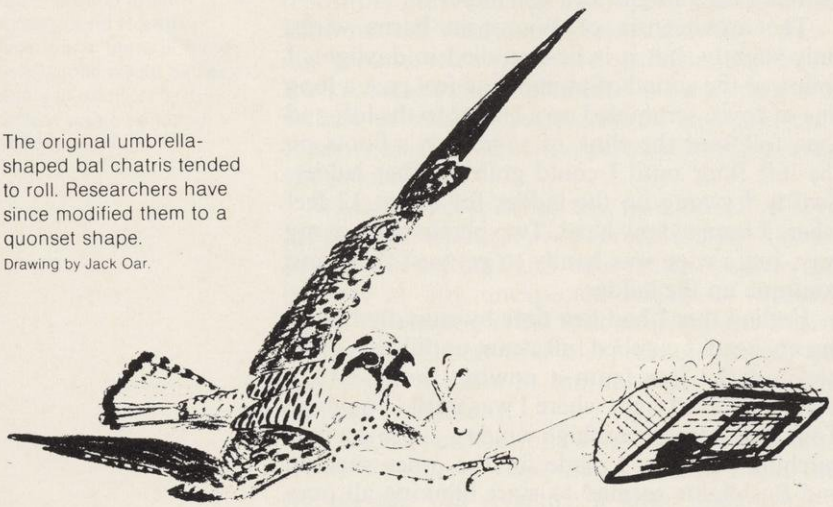
He examined my face. "You're all black and blue!"

"Oh, that was a long time ago."

The police lights shining all over that barn, except up into the rafters, were still a vivid memory.

"Would you like me to tell you about a little girl?"

"Some other time."



The original umbrella-shaped bal chatris tended to roll. Researchers have since modified them to a quonset shape.
Drawing by Jack Oar.

Squirrels build loose ball nests of leaves and twigs where their body heat warms the air to keep them cozy.
Photo by Greg Scott.

Wildlife in winter

RAY KYRO, DNR game manger, La Crosse

Winter is the testing time for wildlife in Wisconsin and some animals succumb. But Mother Nature has outfitted all to come through. When wind sweeps out of the north, when temperatures dip into the minus digits and snow is thigh high, the hardiest are out there safe somewhere, waiting for spring and the annual renewal.

What happens to wildlife in the dead of winter? How do wild things survive or adapt when temperatures plunge and snow covers the land?

Where do the various animals go and what do they do to stay alive during the long "pinch period?".

Wild animals prepare for winter in many ways. With the first frosts, deer shed their cool summer coats and grow new ones with hollow hairs, like tubes sealed at the outer end. With this warm air blanket, deer need little more than the shelter of a blowdown or a conifer tree to stay as warm as toast.

Rabbits walk on air in the winter as a result of the tough, springy hairs that grow between their toes in the fall. By late November, brer rabbit is off the ground by a fraction of an inch on a cushion of hair and air.

The ptarmigan grows feathers on its feet in the fall for winter warmth. The ptarmigan's cousin, the ruffed grouse, or partridge, begins to sprout comb-like fingers on its toes in the fall. By wintertime, the size of his foot area has been doubled and the old forest drummer can walk on the snowdrifts with ease.

Ruffed grouse, sharptail and prairie chickens solve the cold weather problem simply by flying or burrowing into a snowdrift for the night. Rabbits use the same system. This method of staying warm is so good that the US Army has copied it and teaches it in survival training to mountain troops and pilots who operate in cold, snowy climates.

Raccoon sleep away part of the winter but venture out during mild periods.

Researchers have found that the temperature in these snow burrows is 20 degrees "warmer" than the air temperature outside the snow burrow.

Gray and fox squirrels prepare for winter by building loose ball nests of dry leaves and twigs. When the snow flies they curl up and heat the still air around them with their bodies until they are warm and comfortable inside these leaf balls.

The tough little flying squirrel uses hollow trees or woodpecker holes for winter homes. Even at the Arctic Circle, flying squirrels don't hibernate.

Chipmunks differ from squirrels in that they prefer to spend the cold part of the winter in hibernation.

Did you ever wonder how ducks keep their small patches of open water from freezing during cold spells? They apply the simplest of water laws. With their paddling feet, they rile up warm liquid from the bottom of the pond to the top. Ducks use the openings mainly for food, but it keeps their feet warm, too. When temperatures are below zero, they must move fast enough to keep the water at 38 or 39 degrees or it will soon be ice.

Some birds use the football huddle in reverse for warmth and protection in winter. Bobwhite quail often will stamp out a depression in the snow and form a circle with tails in and heads facing out. Then they settle down and each bird warms his neighbors with his body until the entire circle is warm.

Fox prepare well for the winter. They have their best coats by November or December, when their tails are one-third as large around as their bodies. When the cold sets in, they curl up with their tails draped across their noses and feet for maximum warmth.

Bear, skunk, raccoon, badger and opossum sleep part of the winter away but will venture from their quarters during mild periods. Female skunks prefer to stay put and let the males do the winter wandering.

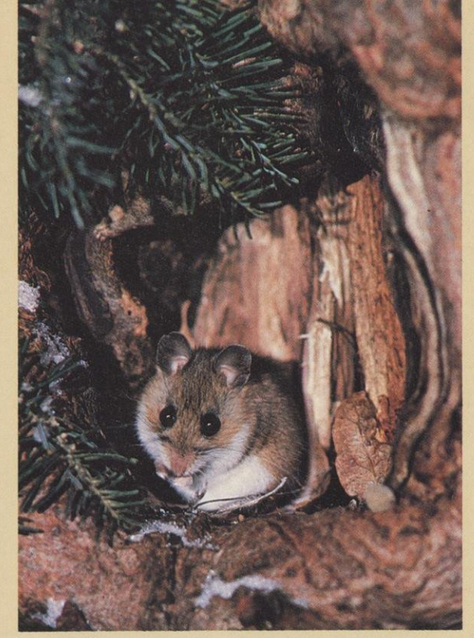
Some bats migrate while others hibernate. The hibernators prefer places with little temperature variation such as large caverns with small entrances. The weasel is active all winter and usually can be found in somewhat open areas in search of mice and other small animals. The weasel, which turns white in winter and whose fur is called ermine, has a voracious appetite because it is so active, and will give any nearby mouse a hearty pursuit, even chasing it into water.

Most mice remain active all year, as do moles and shrews. These tiny mammals occasionally run about on top of the snow, but prefer grassy runways down under. Field mice even raise families under the snow, bearing hairless young in furry ball-like nests.

Mink also are active all year, foraging along frozen stream banks and marshes. In some areas, muskrats make up a high percentage of the mink's winter food.

Woodchucks, ground squirrels, some bats and jumping mice have got it made in the winter. They are Wisconsin's only true hibernators, and sleep the winter away.

As a true hibernator, the groundhog (woodchuck) doesn't even waste much energy in breathing. His body temperature drops to 37 degrees and his breathing is reduced to about one breath per minute. How lazy can you get?



Mice raise families under the snow in furry, ball-like nests.

Photo by Greg Scott.

Rabbits grow tough, springy hairs between their toes to raise their feet a fraction of an inch off the ground in winter.

Photos by Greg Scott.

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