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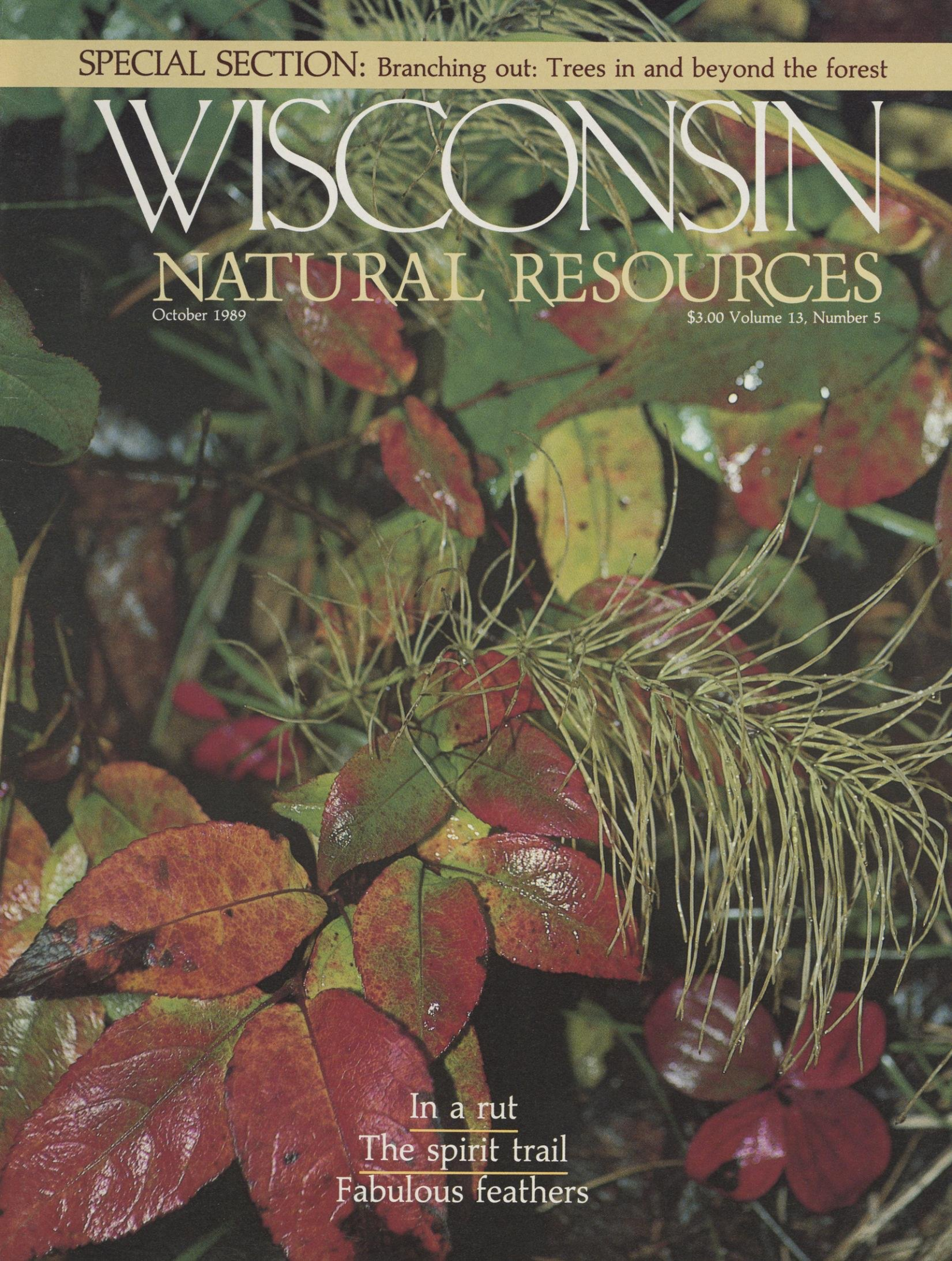
SPECIAL SECTION: Branching out: Trees in and beyond the forest

WISCONSIN NATURAL RESOURCES

October 1989

$3.00 Volume 13, Number 5



In a rut

The spirit trail

Fabulous feathers

JIM MC EVOY

Autumn's quiet retreat

Carol Wooldrage

Powerful wingbeats and straining muscles propel flocks of wild geese and ducks southward each fall.

These migrating animals have spent months hungrily feeding to prepare for the long journey. In flight, their streamlined bodies slip through the wind, their lungs fill with the chilled fall air as instincts drive them to warmer climes: places where food, shelter and cover are more abundant.

Other equally arduous migrations are also taking place. These travelers don't traverse thousands of miles, cross oceans or mountain ranges, but their journey also holds the key to survival.

Shorter daylight and cooler weather trigger many amphibians and reptiles to start a seasonal, vertical migration. They slowly trek the surface sensing where conditions are right, then venture downward, through water and soil, past rocks and roots to find a safe haven.

In northern regions, frogs and toads, snakes and turtles hibernate to escape winter's freezing temperatures. But they can't take that long winter's nap just anywhere. Their death-like sleep beneath the frozen crust and below the frost line insulates them from the sub-zero temperatures that rule above.

Cold-blooded animals that do not heed nature's messages most certainly perish — either from exposure to the cold or from becoming so chilled that they can't move

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WISCONSIN NATURAL RESOURCES

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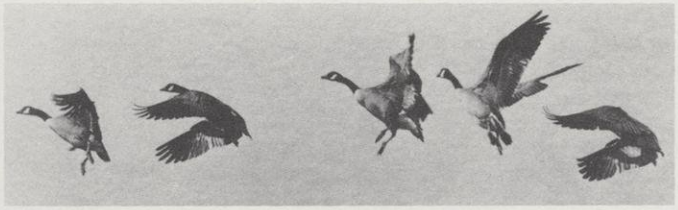

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Robert E. Deer
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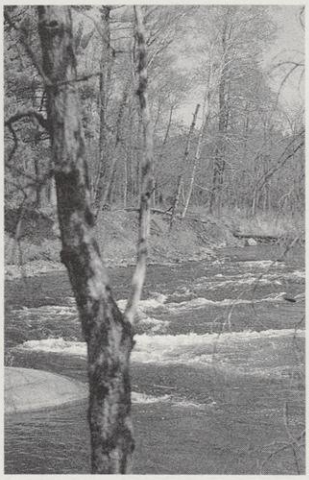

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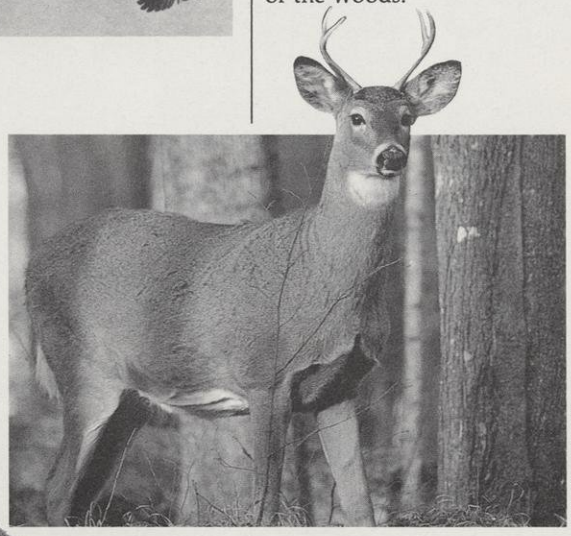

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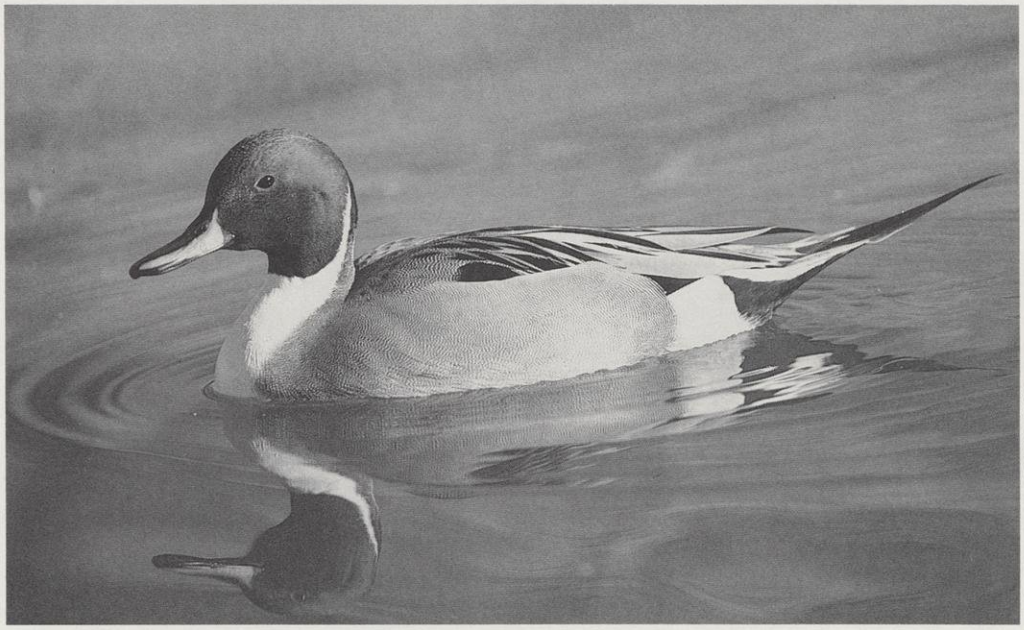
BRANCHING OUT: Trees in and beyond the forest

A long way back for waterfowl



NORTHERN PINTAIL BY HERBERT LANGE

Duck populations in North America took another dive this year, but steps to improve breeding conditions are on the rise.

Thomas G. Jackson

It must have been breathtaking. Early autumn days in the mid-1800s when the fall flights of mallards, wood ducks, teal and canvasbacks blackened the skies. Days when Lake Winnebago and the "upriver lakes" guaranteed a grand day for duck hunter and birder alike.

Now wildlife managers, bog trotters and duck callers alike are tightening their belts, taking a deep breath and collectively charting a course to recovery. Continental duck populations decimated by development, drainage, drought, pollution, overbagging and a steady loss of wetlands, need help in a big way. And they are getting it.

Agreements between Canada and the United States in May, 1986 led to the ambitious North American Waterfowl Management Plan, a blueprint for improving waterfowl habitat and production from breeding grounds in Canada to wintering grounds in the southern U.S. and Mexico. The plan focuses on 37 waterfowl species of ducks, geese and swans. Through habitat protection, restoration and intensive wildlife management, the plan aims to produce continental breeding populations of 62 million ducks and a fall flight of 100 million birds by the year 2000.

During the next 15 years a new Wisconsin Joint Venture of DNR wildlife managers and researchers, the U.S. Fish and Wildlife Service, U.S. Forest Service, Great Lakes Indian Fish and Wildlife Commission, Ducks Unlimited, The Nature Conservancy, the Wisconsin Waterfowlers Association and individual partners propose to permanently protect an additional 30,000 acres of waterfowl habitat and work with private land owners to improve another 33,000 acres for waterfowl and other wildlife. Estimated annual costs would require a whopping $3.2 million annual commitment to habitat improvements. The plan may eventually involve work in Minnesota, Michigan, Illinois and Indiana as the program expands in the upper Great Lakes states.

The current outlook for geese and swan populations are good but tallies of ducks on their Canadian breeding grounds dramatically show the task at hand.

Although the North American duck population fell this year, the

Wisconsin population improved slightly.

"We had good duck production this year," said Jon Bergquist, DNR Waterfowl Specialist. "With the lone exception of blue-winged teal, duck broods did not decline as they did elsewhere in the U.S. or in north and western Canada."

Bergquist attributes the successful breeding season to milder, wet weather and renewed interest in wetland preservation. Wetlands provide food, cover and brood habitat critically important to ducks. Part of the frustration in documenting how and where wetland acres are lost lies in the fact that each community defines "wetlands" differently. Most frequently, small wetlands — less than an acre at a time — are developed or drained, but the combined losses from developing hundreds of such potholes have disastrous consequences for ducks.

Surveys for the Wisconsin Joint Venture plan estimate 3.3 million acres of productive wetland in the Badger State need to be protected for duck habitat. Proposed projects are grouped by region and listed in order of importance for waterfowl.

Southeast focus area — Thousands of acres of marshlands and adjacent uplands in Dodge County could provide prime nesting cover for ducks, pheasants, bobolinks and songbirds. Working with landowners, managers aim to maintain and improve habitat north and west of Lake Sinissippi, and east and west of Fox Lake. The group will also seek leases on farmlands in the region to improve conditions for dabbling ducks.

The gem in the middle of this area is Horicon Marsh, and managers seek to improve nesting conditions for redhead ducks in the marsh.

One area of the Rush Lake-Waukau Marsh Complex currently managed by The Nature Conservancy has been dedicated as the Owen and Anne Gromme Preserve. It will be managed by the Wisconsin Joint Venture compact.

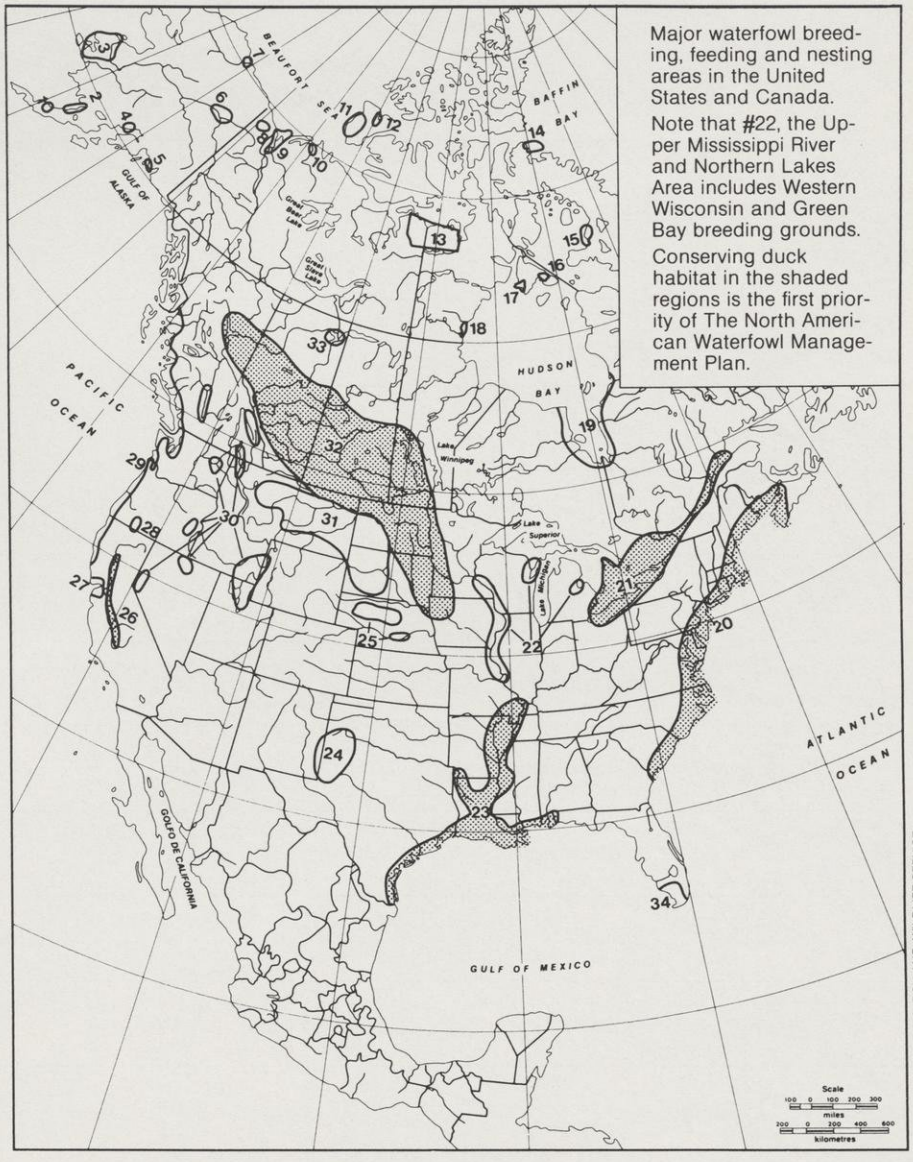
Two townships in Kewaunee County and three townships in Manitowoc County will receive special attention. With landowners' help, planners believe black ducks could increase significantly along this portion of the Lake Michigan coastline.

Northwest focus area — The area called the Glacial Lakes Grantsburg Complex encompassing Crex Meadows, Fish Lake and Amsterdam Sloughs, could provide even greater duck production with more intensive management. The outstanding waterfowl production in St. Croix County could be even more fruitful by plugging drainage ditches, building lowhead dikes and installing other water controls to restore and maintain wetlands during the breeding season.

Another 4,000 acres in Barron and Polk counties could be developed for ducks.

Winnebago system focus area — By increasing aquatic weed beds and fostering more wild celery in upriver lakes, managers believe they can greatly increase use by migrating diving ducks, migrating dabbling ducks and increase populations of resident dabblers five-fold. Managers will also examine the spread of potentially toxic contaminants in fish and wildlife using this region in 1990.

Upper Mississippi River and tributaries focus area — Long revered for its spectacular flocks of migrating ducks, this region has been recognized in the North American



Major waterfowl breeding, feeding and nesting areas in the United States and Canada.

Note that #22, the Upper Mississippi River and Northern Lakes Area includes Western Wisconsin and Green Bay breeding grounds.

Conserving duck habitat in the shaded regions is the first priority of The North American Waterfowl Management Plan.

COURTESY OF THE U.S. FISH AND WILDLIFE SERVICE

Waterfowl Management Plan as one of our nation's most critically-needed areas for migrating waterfowl. Fewer than a half-million canvasback ducks live on the North American continent and most of the eastern U.S. population migrates through this region — more than 6.5 million use-days were tallied in recent years. Along the Mississippi, the plan seeks to protect backwaters, sloughs and streams where wood ducks thrive. By protecting more upland cover, dabbling duck and grassland bird populations are expected to improve. Planned stream stabilization and soil erosion programs will aid both waterfowl and water quality.

Marquette-Waupaca focus area — By controlling carp and reestablishing aquatic plants, managers believe duck production can improve in Adams, Green Lake, Marquette and Waushara counties.

Water controls on the White River Marsh in Green Lake County could significantly increase waterfowl use.

Managers want to cut brush and rebuild eroding dikes on the Mead Project and neighboring McMillan Marsh. Improving water quality would provide more duck habitat.

Central focus area — More than 1,100 wetland acres primarily in Jackson and Clark counties have been maintained by DNR's Scattered Wetlands Program. The Fish and Wildlife Service has plans to restore 19 wetland areas in this region.

Forest fringe focus area — By curbing further shoreline development, curtailing acid rain, securing upland nesting cover and controlling nearshore weed growth, plan managers believe duck production will improve slightly along wooded lakefronts in north central and northwestern Wisconsin.

Ambitious projects bring forth ambitious, thoughtful people

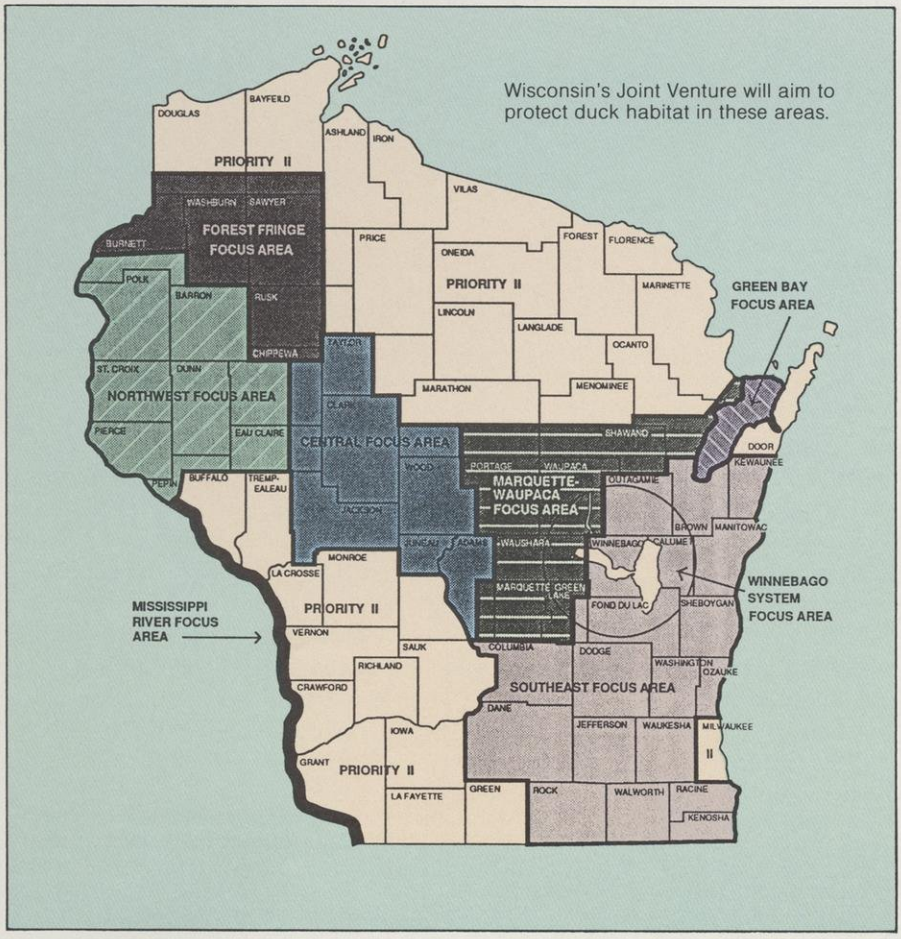
These intensive projects will take tireless efforts by committed people. As a duck hunter, landowner, birder, photographer, educator or naturalist, there's plenty of opportunity to join state organizations dedicated to improving conditions for waterfowl. Individual and group efforts are vitally important to these plans. If you're interested, take the time to contact local

Breeding population estimates for 10 duck species (in thousands)

SPECIES	BREEDING POP. GOAL	1988 BREEDING POP.	1989 BREEDING POP.	PERCENT CHANGE IN 1989 FROM 1988 POP.	PERCENT CHANGE IN 1989 FROM 1955-88 AVERAGE POP.
mallard	8,700	6,550	6,119	-7%	-25%
gadwall	1,600	1,528	1,423	-7%	-5%
American wigeon	3,300	3,168	2,577	-19%	-18%
green-winged teal	2,300	3,143	2,697	-14%	+23%
blue-winged teal	5,300	3,652	3,199	-12%	-34%
northern shoveler	2,100	2,157	1,636	-24%	-18%
northern pintail	6,300	2,577	2,471	-4%	-55%
redhead	760	846	628	-26%	-14%
canvasback	580	435	488	+12%	-12%
scaup	7,600	5,480	5,299	-3%	-23%

GERARD FUEHRER

Banding waterfowl and mapping their movements are important tools for planning habitat needs.



The 1989 duck hunting season

Here's the gist of the current duck hunting season. Season constraints were designed, like last year, to provide limited hunting while continually rebuilding duck populations.

Season — In the north, Oct. 7 (at noon) through Nov. 5; in the south, Oct. 7 (noon) through Oct. 10 and Wednesday, Oct. 18 through Nov. 12. The duck hunting season will be 30 days long; same as last year.

Hunting hours — Sunrise to sunset.

Bag limits — Three ducks daily to include no more than two mallards of which only one may be a hen. Only one black duck, redhead and one pintail can be taken.

Enjoy your hunt, but don't feel obligated to shoot your bag limit.

STEPHEN J. LANG

Blue-winged teal populations have decreased significantly throughout North America. In southern Wisconsin, blue wings nest in hayfields and many young teal were lost in recent years to early-season mowing. The Joint Venture plan calls for buying or protecting upland hayfields during the nesting season.

rod and gun clubs and get involved in a project near your home or a favorite place. Here is a partial listing of the big hitters in waterfowl conservation in Wisconsin:

Ducks Unlimited has donated better than $1.3 million to Wisconsin DNR for waterfowl habitat improvements through the Matching Aid to Restore States Habitat (MARSH) program. Regional Director Dan Olson said Wisconsin's dedication to waterfowl improvement will warrant an additional $200,000 in donations next year from DU's U.S. Habitat Program. These funds will be reserved for large scale projects with well-defined needs such as engineering and development in Horicon Marsh, Crex Meadows, or Rome Pond. Wisconsin is the seventh state to be added to this special program.

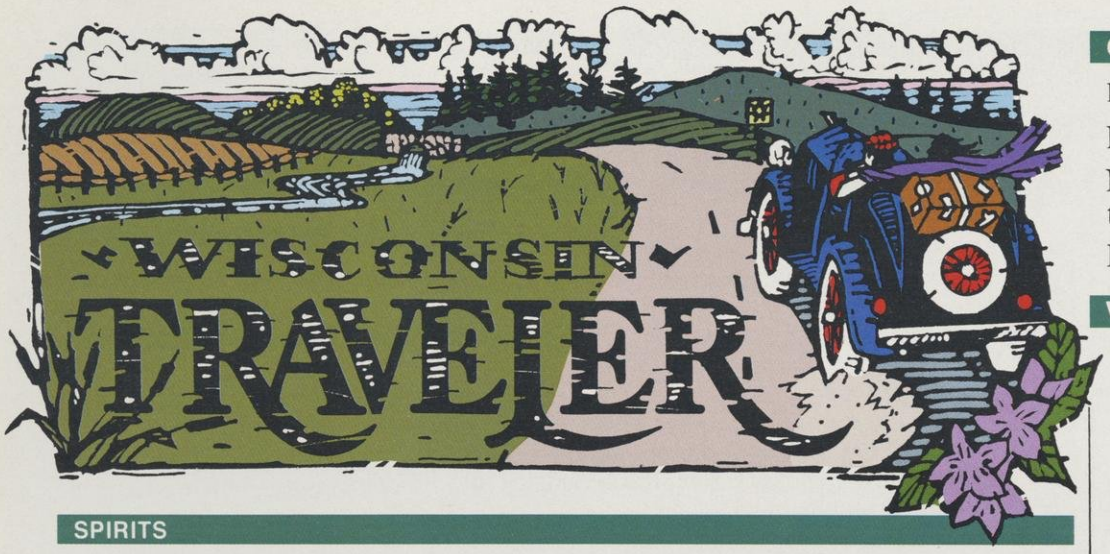
Ducks Unlimited is currently involved in approximately 50 projects concentrated in southeast, east central, and western Wisconsin.

The Nature Conservancy is currently at work preserving fragile wetlands along Rush Lake, Lulu Lake, the Mink River estuary, the Waubesa Wetlands and the Lower Wisconsin River.

The **Wisconsin Waterfowlers Association** provides about $100,000 per year to the Wisconsin DNR and the U.S. Fish and Wildlife Service for preserving and improving waterfowl habitat.

Other groups with active habitat management or protection programs include the Audubon Society, Wings Over Wisconsin, and Pheasants Forever. ■

Thomas G. Jackson works with Wisconsin Natural Resources magazine while pursuing a graduate degree in English at the University of Wisconsin-Madison.



OCTOBER 1989

INSIDE

Hawk watch
No time like snow time
Fighting road fatigue

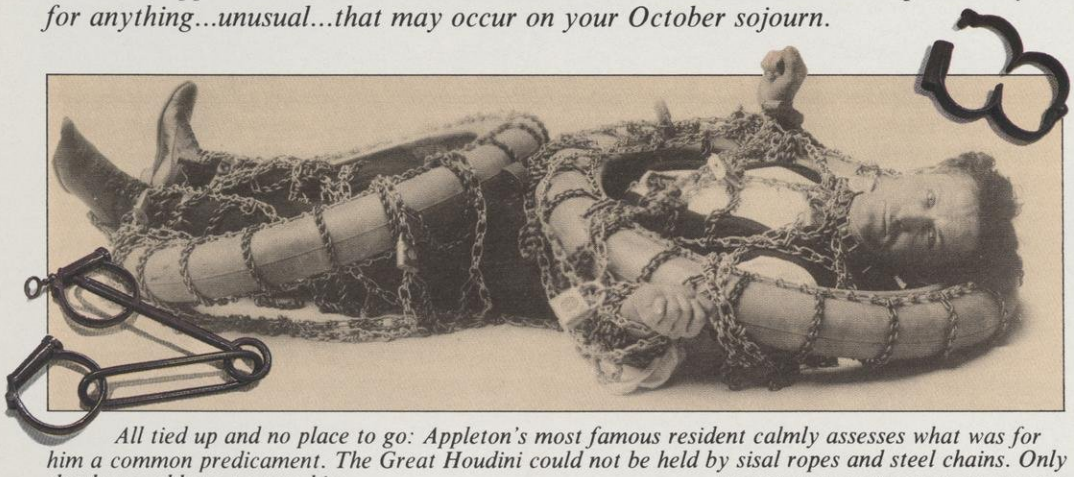
VOLUME 1 NO. 4

SPIRITS

A spirited state

To many an untutored wanderer, Wisconsin conjures up pastoral images of softly rounded green hills etched by acres of corn and dotted with salt-and-pepper Holsteins. Hah! Perceptive souls willing to dig beneath this pleasant surface find there's conjuring of a different sort going on in the Badger State — a place where spooks, spirits and other denizens of the dark are wont to linger, particularly in late October.

Come along — if you dare — on a journey to meet two of Wisconsin's most notorious apparitions. WARNING: Wisconsin Traveler assumes no responsibility for anything...unusual...that may occur on your October sojourn.



All tied up and no place to go: Appleton's most famous resident calmly assesses what was for him a common predicament. The Great Houdini could not be held by sisal ropes and steel chains. Only death was able to capture him. Wisconsin Center for Film and Theater Research

His given name was Ehrich Weiss. He was born on March 24, 1874 in Budapest, Hungary; shortly thereafter, his family sailed to America and settled in Appleton, Wisconsin, where young Ehrich spent the first nine years of his life.

Something about the Fox Valley city must have influenced the boy — the sparkle of a people busily settling a state, perhaps, or the enormous power of land so broad it could never be tamed. Snide folk remarked that his most astounding trick of all was escaping Appleton.

We are speaking, of course, of history's greatest escapologist and magician, Harry Houdini.

Houdini's ability to defy ropes, handcuffs, straitjackets, coffins, prison cells, sealed trunks and breathtaking drops into deep water was so extraordinary that many believed he had supernatural powers. Indeed, it seemed the supernatural was the only thing that could hold him, for his obsession in life was to break the bonds of death: Once dead, he assured his family and fans, he would attempt to send a message to the living. Many are those who claim to have heard his voice.

Houdini died on October 31, 1926 in Detroit, but Appleton never forgot her most elusive resident. The

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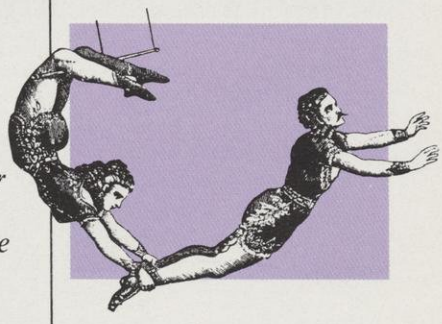
Circus sensation!



"Ladies and gentlemen! Boys and girls! Welcome to the greatest show on earth, presented without benefit of a canvas tou-pay!

"Yes, friends, the Big Top is tucked away for the season. But the show must go on, even when it's 10 below with a foot of snow. Now, for the first time in its 30-year history, **Circus World Museum** is open year 'round!

"The world's largest museum devoted to the greatest show on earth, Circus World is located on the site of the original winter quarters of the Ringling Bros. Circus in Baraboo. In true circus fashion, the animals and entertainers performing here in the summer head south for the winter. They have left in their stead a spectacular sideshow: the all-new, 21,000 square-foot Irvin Feld Exhibit Hall & Visitor Center!

"Named in honor of the late Ringling Bros./Barnum & Bailey Circus impresario, the Feld Exhibit Hall houses the Howard Bros.

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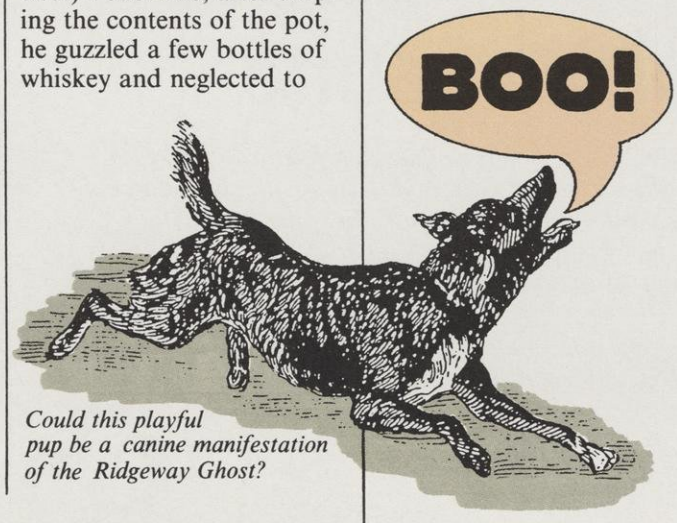
Continued from page 1

city invites you to celebrate his magic this Halloween.

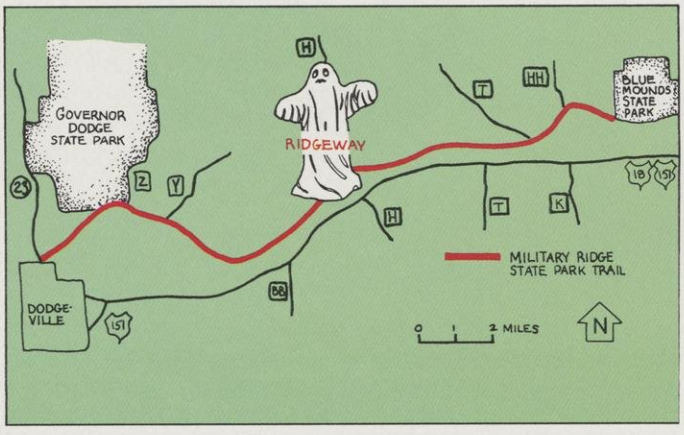
Start in the afternoon with a visit to the **Outagamie Museum's Houdini Exhibit**, containing handcuffs, letters, scrapbooks, handbills and other items from Houdini's personal collection. Around dinner time, choose one of the city's fine restaurants for your evening repast. While dusk vanishes into dark, pursue Houdini's trail on the **Houdini Walking Tour** — 15 downtown Appleton sites marked with brass plaques detailing the escapologist's early life. Along the way you may meet others seeking a message from the magician. Why not join hands and give Houdini a call?

•

One can only wonder if the Great Houdini has made the acquaintance of Wisconsin's infamous Ridgeway Ghost in the afterworld.



Could this playful pup be a canine manifestation of the Ridgeway Ghost?



The mischievous apparition plied his trade in the 1840s and 50s along the old Military, or Ridge Road, the main highway for farmers and lead miners hauling goods to Milwaukee. He was especially fond of the 25-mile segment running from the Pokerville settlement near Blue Mounds to Dodgeville, where there were numerous watering holes. Ridgeway, the approximate halfway point, was the undisputed "Host to the Ghost."

Scaring the bejabbers out of unsuspecting wayfarers was the ghost's chief delight. He loosened carriage wheel pins and stampeded horses, hitched rides on wagons without invitation and chased those on foot until they could run no more. He joined a card game at a saloon in (where else?) Pokerville; after swiping the contents of the pot, he guzzled a few bottles of whiskey and neglected to pay the barkeep. Once he appeared as a drove of phantom pigs; on another occasion as a vicious black dog. So they say.

The spook "gave up the ghost" about 1857, when the railroad came through Mineral Point and the traffic (and taverns) dwindled on the Military Road. He rode away on the cowcatcher of a train engine as it pulled out of Ridgeway. So they say.

Decide for yourself. Bike or walk the portion of the **Military Ridge State Park Trail** from Blue Mounds State Park to Dodgeville — it retraces the route of the famous road. Stop for refreshments in a Ridgeway tap or restaurant. Whatever you do, don't look back. He might be gaining on you.

Outagamie Museum, 330 E. College Ave., and details on the Houdini Walking Tour, (414) 733-8445; Fox Cities Convention & Visitors Bureau, (414) 734-3358; Military Ridge State Park Trail, (608) 935-2315; Dodgeville Area Tourist Information, (608) 935-5993. For a copy of "Biking Wisconsin's State Park Trails," send $4 to DNR Bureau of Parks and Recreation, Box 7921, PR/4 TRV, Madison WI 53707.

Snow fun

Once the frost is on the punkin, can the "S" word be far behind? Schussers, skaters, snowmobilers and sleigh riders can stay on track with "Wisconsin Winter Adventures," a new 144-page guide to the state's 37 downhill ski hills, more than 300 cross-country ski trails, snowmobile trails and even sleigh ride operators. The guide features a winter calendar of events, exhibits, fairs, winter carnivals, theater, music, dance, sporting events and holiday celebrations.

Wisconsin Division of Tourism Development

All listings include directions from nearby cities, mailing addresses, hours of operation, chalet and lodge information, and phone numbers.

For a free copy, write the Wisconsin Division of Tourism Development, P.O. Box 7606, Madison, WI 53707 or call toll-free 1-800-432-TRIP.

Need more information?

Travel questions: 1-800-372-2737
Travel publications: 1-800-432-TRIP
Road conditions: 1-800-ROADWIS
Outdoor recreation: (608) 266-2277
(608) 267-6897 (TDD)
Historical Society sites: (608) 262-9606

Flight path

Come fall, travelers aren't the only beings in motion. Cast a glance upward and there's a good chance you'll see hawks and other birds of prey migrating to their winter ranges.

En route, the birds follow the shores of large bodies of water — a clue to choosing the best spots for viewing. Pack binoculars, a field guide for identification and a picnic lunch, then head for **Nelson Dewey** or **Wyalusing** state parks on the banks of the Mississippi River in Grant County. Hawks will be heading south in late September. In late October and early November, watch for bald eagles perched high in the trees, preparing to swoop down to the water for a quick fishy snack.

You'll see red-tailed, red-shouldered and rough-legged hawks cruising the updrafts along the beaches of lakes Michigan and Superior this time of year. **Harrington Beach** and **Kohler-Andrae** state parks, both north of Port Washington on Lake Michigan, are good places to watch the feathered parade.

Broad-winged hawks migrate in large flocks called "kettles." Keep an eye on the sky as you follow the Lake Superior shore on Highway 13 east of Superior — you may catch a kettle at full boil!

A red-tailed hawk on the wing.
Robert Queen

Resting at a wayside perch, an eagle scans the route south.
Herbert Lange

DNR Bureau of Endangered Resources, (608) 266-7012; Nelson Dewey State Park, (608) 725-5374; Wyalusing State Park, (608) 996-2261; Harrington Beach State Park, (414) 285-3015; Kohler-Andrae State Park, (414) 452-3457; Superior Area Chamber of Commerce, (715) 394-7716.

Dark secrets

Travel in the latter months of the year represents a challenge for motorists. Shorter days mean more driving in the dark, and dark is a signal to the body to stop shifting gears and start sleeping. Follow these tips to combat late-night fatigue on the road:

Illustrations by Rich Malone

1. *Avoid driving alone.* Passengers can spell each other and keep up a conversation. (Ride with someone who has opposing political views; you'll find plenty to discuss.)

2. *Lower the temperature inside the car.* Keep cool, fresh air coming in through a vent or an open window. A brisk atmosphere will help you stay alert.

3. *Keep your body actively involved in driving.* Forget the cruise control at night. Sit up straight, head up, shoulders back.

4. *Deflect highway hypnosis.* Shift your eyes from side to side, check the rear-view mirror often, and remember to blink!

5. *Stop every two hours.* Get out of the car, walk around, do a few jumping jacks. Keep blood circulating to the brain.

6. *Easy on the refreshments!* Light meals and snacks are fine, but heavy meals and alcohol should be avoided; they'll make you drowsy. A cup of coffee can help, but too much will make you jittery.

7. *Crank up the radio!* Change stations often and sing along with your favorite tunes. If you have a tape deck in your car, Traveler suggests the following numbers to rivet your attention: the Fourth Movement of Beethoven's "Symphony No. 9 in D Minor"; Bon Jovi's "You Give Love a Bad Name"; "Take This Job and Shove It" by Johnny Paycheck; and "Dizzy's Party" by Dizzy Gillespie. Avoid New Age music and Mantovani until you've reached your destination.

8. *When all else fails, stop and snooze.* Pull into a wayside or parking lot, lock the doors, open the windows a crack and take a 20-minute nap. You'll wake refreshed and ready to roll.

Wisconsin Department of Transportation, (608) 266-0402.

CIRCUS WORLD MUSEUM

The greatest show on earth is on display in Baraboo.

Circus World Museum

Continued from page 1

Circus — the world's largest circus produced in miniature, on a scale of three-quarters of an inch to one foot! You'll see elaborately painted wagons! Wood carvings! Posters! Photographs! Costumes! Numerous rare circus treasures never before exhibited to the public! Witness unique presentations of a mysterious but entertaining nature!

And if you attend in October, you will see — absolutely free — the stunning palette of fabulous fall chroma draped upon the hardwoods of southwestern Wisconsin! Hurry, hurry, hurry! $3.25 adults, $1.75 children."

Circus World Museum, (608) 356-0800; Baraboo Chamber of Commerce, (608) 356-8333.

Chore-tainly!

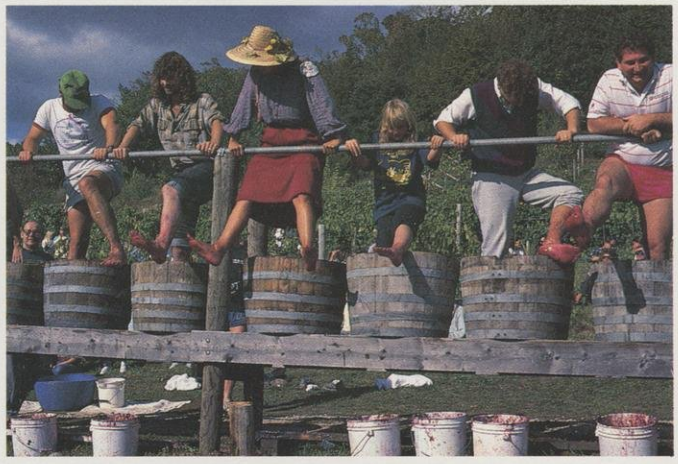
The most modern-day Wisconsinites do to prepare for winter is dust off the Sorels and locate stray mittens. Wisconsin's early European settlers faced more pressing late-autumn chores: gathering and preserving garden produce, chopping wood, butchering, spinning, soapmaking.

Old World Wisconsin in Eagle makes ready to stave off Old Man Winter during "Autumn on the Farms," on Saturday, October 21 and Sunday, October 22. Clad in authentic clothing, the Old World staff will salt down a mess of sauerkraut, mix rendered lard and homemade lye to make soap, ready hogs and geese for market and host an old-fashioned quilting bee. Whew! Be glad you're watching and not working! Old World Wisconsin, Eagle, (414) 594-2216.

State Historical Society

WINERIES

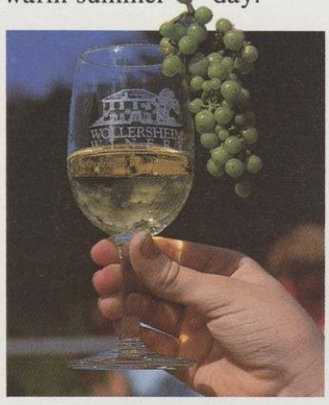
Summer in a bottle



Purple feet greet the spectators at a winery grape stomp.

Laurel Fisher Steffes

Lively spirits, as noted earlier in this Traveler, can be found almost anywhere in the state: All you need do is uncork a bottle of fine Wisconsin wine to release the sprightly essence of a warm summer day.



The fruit of the vine.

Laurel Fisher Steffes

Wisconsin's wineries turn a cornucopia of locally-grown fruits into delicious beverages each fall. Why not visit one this season? Stroll through the golden vineyards and orchards, then wander inside to learn about the natural process of fermentation during a guided tour of the cellars. Later, put that discriminating palate to the test at the wine tasting. (Be sure to buy a bottle of your favorite to savor later at home.) Wineries offer a variety of activities, from movies to grape stomps and barrel rolls. Call in advance to verify events and tour times.

Algoma: Von Stiehl Winery, (414) 487-5208;

Carlsville: Door Peninsula Winery, (414) 743-7431;

Cascade: Kettle Moraine, (414) 528-8697;

Cedarburg: Stone Mill Winery, (414) 377-8020;

Highland: Spurgeon Vineyard & Winery, (608) 929-7692;

La Crosse: Christina Wine Cellars, (608) 785-2210;

Lodi: Bountiful Harvest Winery, (608) 592-5254;

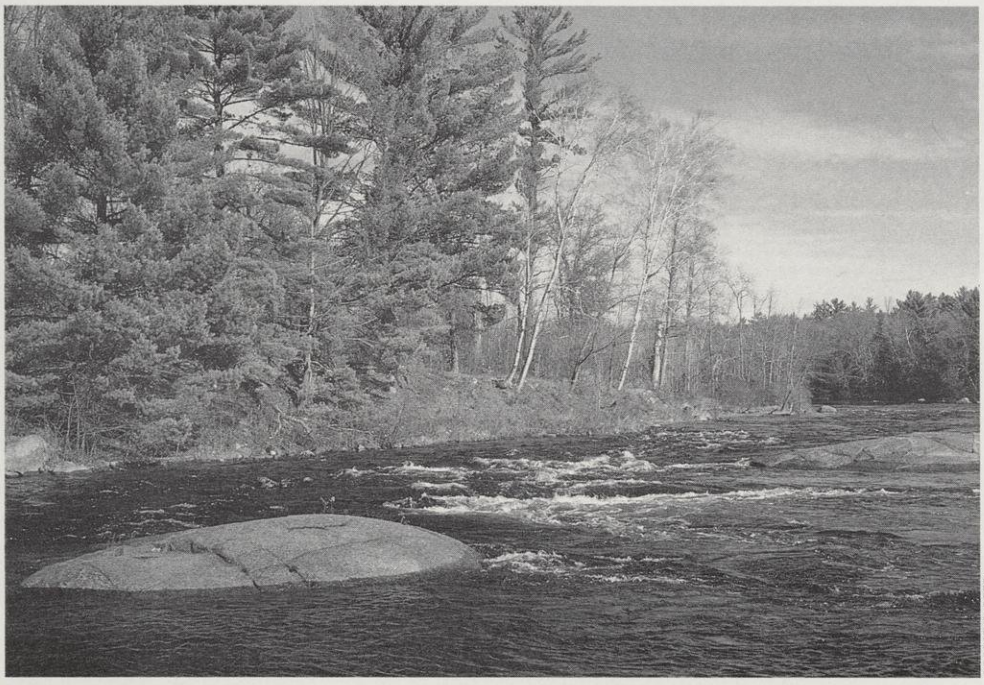
Prairie du Sac: Wollersheim Winery, (608) 643-6515;

Three Lakes: Fruit of the Woods Wine Cellar, (715) 546-3080.

Wisconsin Traveler is produced by Wisconsin Natural Resources magazine in cooperation with Wisconsin's Division of Tourism Development, Department of Transportation, and State Historical Society.

the Spirit Trail

On the wooded paths, riverbanks and fields along the Wolf River, a native Wisconsinite contemplates his roots and our future.



ROBERT E. DEER

Where the geese fly. The spirit trail winds along the banks of the Wolf River just beyond these trees.

Robert E. Deer

The centennial of Aldo Leopold's birth and the celebrations of the wisdom of his teachings ended more than a year ago for many people, but not for me. His words are with me yet. He spoke directly to me when he wrote, "For us in the minority, the opportunity to see geese fly is more important than television and the chance to find a pasque-flower is a right as inalienable as free speech."

I know that feeling. I was raised on the Menominee Indian Reservation along the banks of the Wolf River where the geese flew.

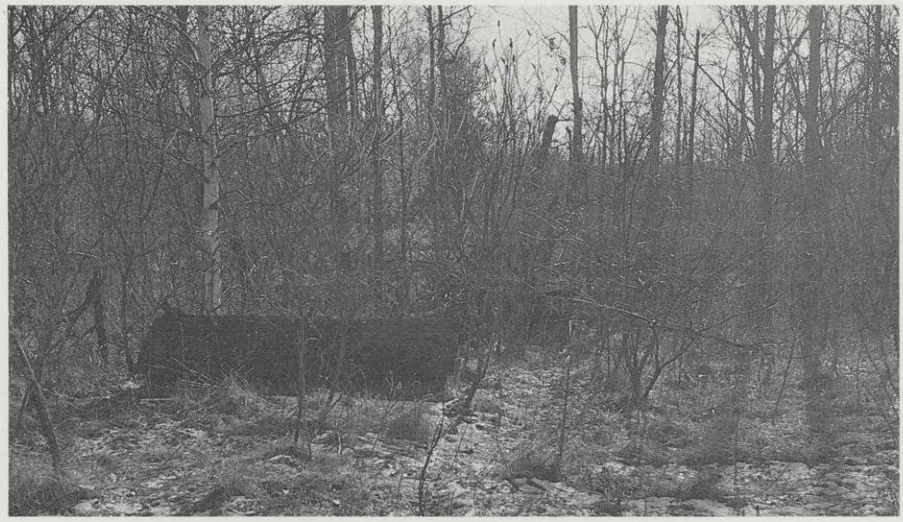
More than his importance as the father of wildlife ecology or game management, more than his role as teacher or environmental mentor, Leopold's thoughts are part of my Indian heritage and he is one of my ancestors.

The oral Indian traditions and Leopold's writings share a common concern for the earth. Through them, both Native Americans and "The Professor" affirmed a common vision of a natural world and its uncommon spirit. Their collective creativity never died and it is with us in the Indian spirit world.

Most of you don't know about the spirit world of the American Indian. Schools teach nothing about the concept and it isn't a part of your life, but it is a part of mine. It still lives on the Menominee Indian Reservation and in my childhood memories.

I still hear the nighttime messengers from the Indian spirit world; the owl and whippoorwill calling out from the white pines at the end of the field. These trees occasionally held the spirit lights — huge, glowing, unblinking, unmoving lights along the spirit trail between the field and the forest, the river and the road. I saw them through the eyes of a child and they were very real. Believe it!

The Menominee have a strong belief in life after death in the spirit world. Each morning after a particularly troublesome night with the messengers from the spirit world a believer made "offerings" by the Wolf River to integrate the spirit world of night with the physical world of day. This was considered a very private, personal act and it taught me to see the whole world — the interrelationships among land, water and sky; night and day; life and death.



ROBERT E. DEER

Simple, but revered grave sites adjoin this physical and spiritual path for contemplating nature and the nature of life.

Leopold called it the land ethic. Like him, the Menominee taught that nature was the gate to the great mystery of death and the spirit trail was a physical path for contemplating and enriching that philosophy. Here lay both nature and the remains of our ancestors.

The famous Indian Chief Seattle knew of such places, as important to his Suquamish and Duwamish tribes in the Pacific Northwest as to the Menominee in the Midwest.

"To us the ashes of our ancestors are sacred and their resting place is hallowed ground. You wander far from the graves of your ancestors and seemingly without regret. Your religion was written upon tables of stone by the iron finger of your God so that you could not forget. The Red Man could never comprehend nor remember it. Our religion is the traditions of our ancestors — the dreams of our old men. . . . Your dead cease to love you and the land of their nativity as soon as they pass the portals of the tomb and wander way beyond the stars. They are soon forgotten and never return. Our dead never forget the beautiful world that gave them being. They still love its verdant valleys, its murmuring rivers, its magnificent mountains, sequestered vales and verdant lined lakes and bays, and ever yearn in tender, fond affection over the lonely hearted living, and often return. . .to visit, guide, console and comfort them."

Once, as a young child, I was running through a portion of the spirit trail which crosses a large field. I almost ran right into a black bear in the tall grass. We both stopped and

looked into each other's eyes from a few feet away. Strangely enough, I wasn't afraid and neither was the bear. Our spirits were at peace here on the trail, and we accepted each other's presence

After a few minutes, we stopped looking at each other, both turned and ran away.

Again from Chief Seattle from 1853: "What is a man without the beasts? If all the beasts were gone, man would die from a great loneliness of spirit. For whatever happens to the beasts soon happens to man. All things are connected."

He loved the beauty of animals in the wilderness as did Chief Joseph of the Nez Perce in describing a final resting place: "I buried him in that beautiful valley of winding waters. I love that land more than all the rest of the world."

These chiefs and great thinkers like Leopold were visionaries, who provocatively promoted their ideas. Respect for wildlife, respect for nature, a sense of a place for everything in a natural order and a partnership with nature rather than human dominion.

I hear the voices and rekindle the spirits of those who walked the spirit trail before me. I try to absorb the lessons of this nation's first environmental prophets. Chief Seattle said this about the spirit life: "When the last Red Man has vanished from this earth, and his memory is only a shadow of a cloud moving across the prairie, these shores and forests will still hold the spirit of my people."

And he made these observations about the spirit of white men: "The whites too shall pass; perhaps sooner than all other tribes. Continue to contaminate your bed and you will one night suffocate in your own waste. But in your perishing, you will shine brightly."

Like Leopold, many of the Indian chiefs recognized that their lives were shaped and clarified by their partnership with the world.

What is life? Crowfoot, the great Blackfoot orator, was asked on his deathbed. He responded, "It is the flash of a firefly in the night. It is the breath of a buffalo in the winter time. It is the little shadow which runs across the grass and loses itself in the sunset."

I walk along the spirit trail, along the Wolf River, and many walk with me.

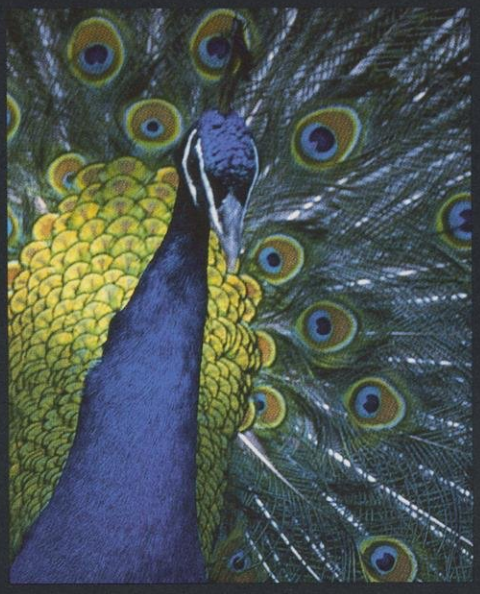
WISCONSIN DEPARTMENT OF TRANSPORTATION

Spirit Rock

One night long ago, a Menominee Indian dreamed that Manabush, grandson of Ko-Ko-Mas-Say-Sa-How (the Earth) and part founder of the Mejawin or Medicine Society, invited him to visit. With seven of his friends, the Indian called on Manabush who granted their request to make them successful hunters. One of the band, however, angered the god by asking for eternal life. Manabush, seized the warrior by the shoulders, thrust him into the ground and said, "You shall be a stone, thus you will be everlasting."

The Menominee say that at night kindly spirits come to lay offerings of tobacco at the rock and that if one looks closely, you can see their white veils among the trees. The legend is that when the rock finally crumbles away, the Menominee race will be extinct.

Robert E. Deer is a Menominee, member of the Tribal Legislature and DNR employee who is committed to conserving resources in both Indian and non-Indian worlds.



fabulous feathers

Light, bright, supple and strong, feathers are a remarkable natural adaptation.

Text and photos by Pat Vosburgh

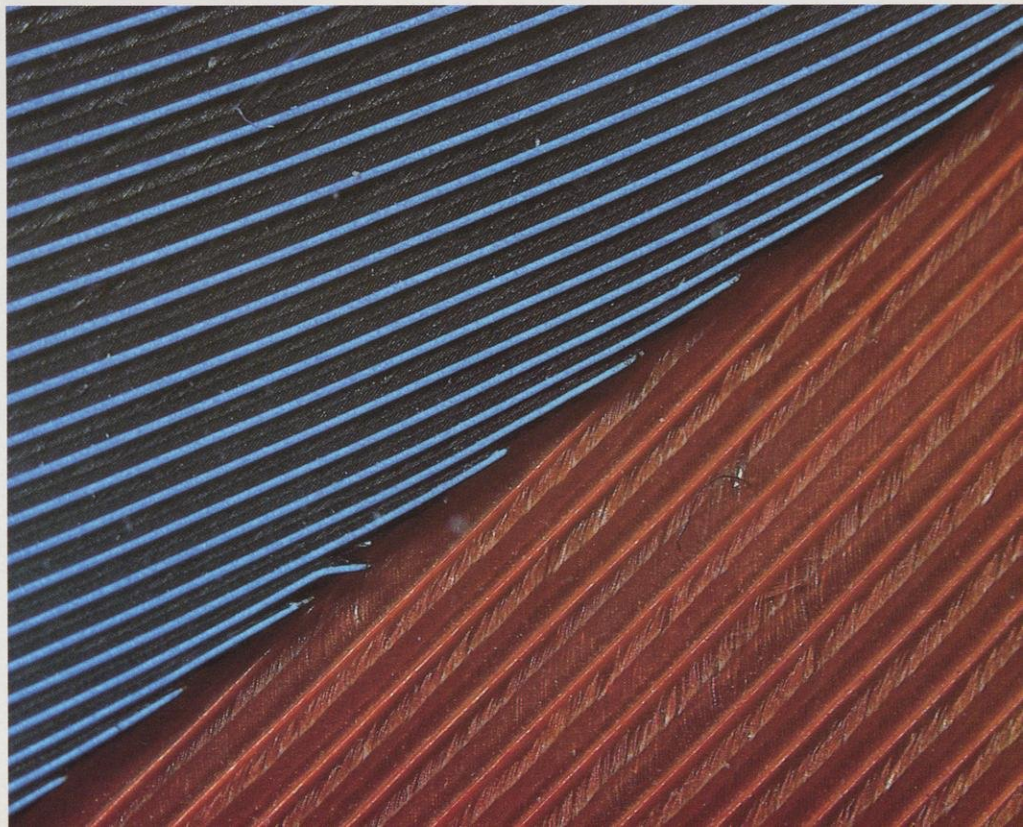
From the scales of reptilian ancestors through eons of evolution, nature created the fragile feather, the colored and patterned plumage unique to birds.

Seemingly fragile, feathers are actually one of nature's strongest, most durable creations. Feathers shelter birds from the environment, enable flight, provide camouflage, ease mutual recognition, and signal courtship.

Feathers grow from follicles in the skin and are composed of the same keratin that forms a bird's horny bill, claws and the scales on its legs. The center shaft of a feather is round and hollow. An opening at the end of a new feather allows blood to enter during its short growth period. When growth is complete, the feather seals off and is technically dead, although it can be moved by muscles.

Dress designers would be hard put to create costumes of such beauty, durability, and seasonal variety. The colors and patterns of a bird's plumage are determined by its genetic inheritance, its sex, the season of the year, and its diet. Some pigment colors, such as red, orange, and yellow, are affected by food — flamingos acquire their vivid pink/red through their diet — and their color fades if their food sources change.

Some colors, especially blue, arise from an optical illusion caused by the feather's structure. The feathers themselves are not actually blue; the color is produced when light passes through and reflects a layer of colorless cells overlying the dark brownish



(left) A false eye pattern on peacock feathers dissuades competitors.
(right top and bottom) The brilliant hues of macaw feathers.

basal colors in the feather. In some light the spectrum is reflected or absorbed so feathers may not yield familiar shades of blue. That's why bluebirds or blue jays, for example, sometimes look grayish. Pigments and reflection may combine to create, for instance, the green of a parrot, where blue cells are overlain by yellow-celled pigments.

Iridescent feathers with vivid, almost metallic color, are especially visible on bodies and throat patches of hummingbirds and serve as a courtship signal. The shimmering green head and neck of the male mallard and the vivid violet-blue wing patch that several duck species sport display iridescence.

Birds adjust feather positions by flexing muscle bands, which can not only raise and lower the feathers, but also draw them together, twist them, or combine these actions. This ability, of course, is the basis of flight. Birds use their wings for support, lift and steering; their tail feathers for steering and braking. The bird's powerful breast muscles sweep the whole wing up and down from the shoulder; the primary feathers twist back and forth in a figure-8 pattern. The feathers in this "hand" section are moved independently by the bird's wrist; they separate like fingers to maintain control.

Birds bear several kinds of feathers. Stiff contour feathers on the wings and tail are most important for flight. Softer feathers, called semiplumes, hidden beneath contour feathers have a strong shaft and a soft strong network of barbed webs on either side of the shaft. These pad the contours of the body with insulation. Down feathers — the bird's undercoat — provide insulation and protection. Down is especially thick and plentiful in water birds, while altogether absent in others. Owls, which depend upon silent flight for seeking prey, have down mufflers on their feathers, especially the flight feathers. Birds like mourning doves have wings that whistle on each down stroke.

Other feathers are quite bristly and barbless, and may be mistaken for hair. Bristly feathers form eyelashes; the barn owl has bristles on its toes; the bristle-thighed curlew on its legs; and flycatchers and redstarts on the base of their bills forming a net to catch insects on the wing.

Head feathers may elongate, accounting for the top knot on the tufted titmouse and the crests of the blue jay, cardinal and pileated woodpecker. "Eared" owls have a tuft of feathers on either side of the head; so does the horned lark. Woodpeckers and chimney swifts have stiff tail feathers to help them prop against vertical surfaces.

To protect these valuable tools, birds regularly clean their feathers. This process, called preening, also mends splits in interwoven feather barbules. Mending is important because the barbed branches of feather vanes interlock to form strong structure for flight, as well as insulate and protect birds. During preening, birds rub oil glands at the base of their tail feathers to smooth and dress their plumage to repel water. Some birds, notably the anhinga, lack this oil gland; after an underwater search for prey, the anhinga must hang out its wings to dry in the sun. In a particular form of preening called anting, some birds carefully lift ants or another acid substance into the feathers, possibly to get rid of parasites. (Some birds have used beetles, mealworms, raw onion, fruit, hair tonic, even coffee grounds or vinegar.) Feather grooming may also include water and dust baths.

Despite their durability and lavish care, feathers wear out and must be replaced regularly by an annual or semi-annual molt. Most birds molt symmetrically to maintain flight and reduce vulnerability. But many water birds — loons, grebes, anhingas, flamingos, ducks, geese, swans, and even some cranes and rails — lose all their flight feathers at once and are effectively grounded for weeks until new ones grow in. Ducks can be especially vulnerable at this time; they are said to be "in eclipse" and hide from possible enemies in swamps and marshes until their flight feathers have grown again.

Some birds change pattern and color with the season without molting. The male bobolink's bright white, black, and buff mating plumage appears when the yellowish feather tips of its early spring plumage wear

Soft, airy down feathers.

top left: Herring gulls have stiff contour feathers and long tapered wings for sustained flight.

bottom left: Semiplume feathers provide both padding and insulation between flight feathers and the downy undercoat.

away and reveal the black. The brighter spring plumage of various male birds is similarly revealed: gray throat feathers of the male house sparrow wear away and in the spring he sports a natty black bib — his courting dress.

Patterns, called cryptic plumage, help to camouflage many water and wading birds, concealing them from prey. The dark stripes of the American bittern, for example, often make them nearly invisible. Patterns break up the silhouettes of killdeers and semipalmated plovers, making them hard to distinguish at a distance.

How many feathers does a bird have? Not surprisingly, ornithologists have attempted to count. Many birds have 20 percent fewer feathers in the summer than in the winter even though the feathers continue to grow in predictable patterns over the body — summer clothing is lighter! Hummingbirds have from 9000 to 1,000 feathers, a rather small total, and one patient ornithologist counted 25,216 on a whistling swan. Small birds likely have more feathers per unit of body weight than larger birds due to their high metabolism and the constant need to retain heat. Feathers make up from four to 12 percent of a bird's total weight.

Human beings have found many uses for feathers. Quills wrote our Constitution, and many a poetic flight of fancy has been penned by plumes. Down feathers fill pillows and vests, and feathers have adorned both primitive and modern peoples; sometimes, as with egrets at the turn of this century, to the endangement of a species. How much more noble these fragile feathers look on the wing in courtship or flight.

Whether the avian apparel graces the humble sparrow's bib or the proud peacocks spectacular fan tail, feathers are a marvel to behold and one of nature's great wonders. ■

Writer, photographer and naturalist Pat Vosburgh lives in Bethesda, Maryland. Versions of her story previously appeared in the National Zoo's "Zoogoer" and "Bird Watcher's Digest."

Feather tips gradually wear away or break off from the rigors of flight and daily use. As birds molt, old feathers are shed and new feathers grow from a cylindrical sheath shown above. When feathers reach a certain length, the protective sheath splits. Birds nip away the remaining bits of the cuticle-like sheath, smoothing and oiling their new feathers during preening.

More than a mouthful

When fish fight fowl, bet on the bird!

Text and painting by George S. Bachay

How much weight can an osprey lift? As a rule of thumb, the "experts" say ospreys and eagles can only lift and carry their own weight, but don't bet on it.

During a heavy rainstorm we were looking out across the Sugar River through our window with DNR Southern District Director James Huntoon. At times the rain poured down so densely we could hardly see across the channel.

Suddenly an osprey plunged feet first into the water in front of the pier, 75 feet from our window. The fish hawk sank its long talons into a big fish and was struggling to lift it. Then it began sinking until only its head and wing tips were visible. We thought the big bird was a goner.

It seemed like a long time before the osprey pulled the fish to the surface, flapping soggy, but powerful wings on the water. But it couldn't lift the fish. Finally, the fish helped by swimming to the surface in a struggle to escape. The osprey pulled it across the narrow channel to a mud flat. Then we could see it was **big** carp.

The osprey lay on its side, exhausted, while the carp flopped in the marl. The powerful bird couldn't let go. Its talons were locked in the carp's back. Another osprey appeared, apparently its mate. Both birds feasted on the fish for hours before the trapped bird could release its grip. If the channel had been deeper the osprey would have drowned.

Not a word was spoken as Huntoon, my wife Theresa and I watched the drama unfold.

"If I hadn't seen it, I wouldn't have believed it," Huntoon admitted. "What a sight."

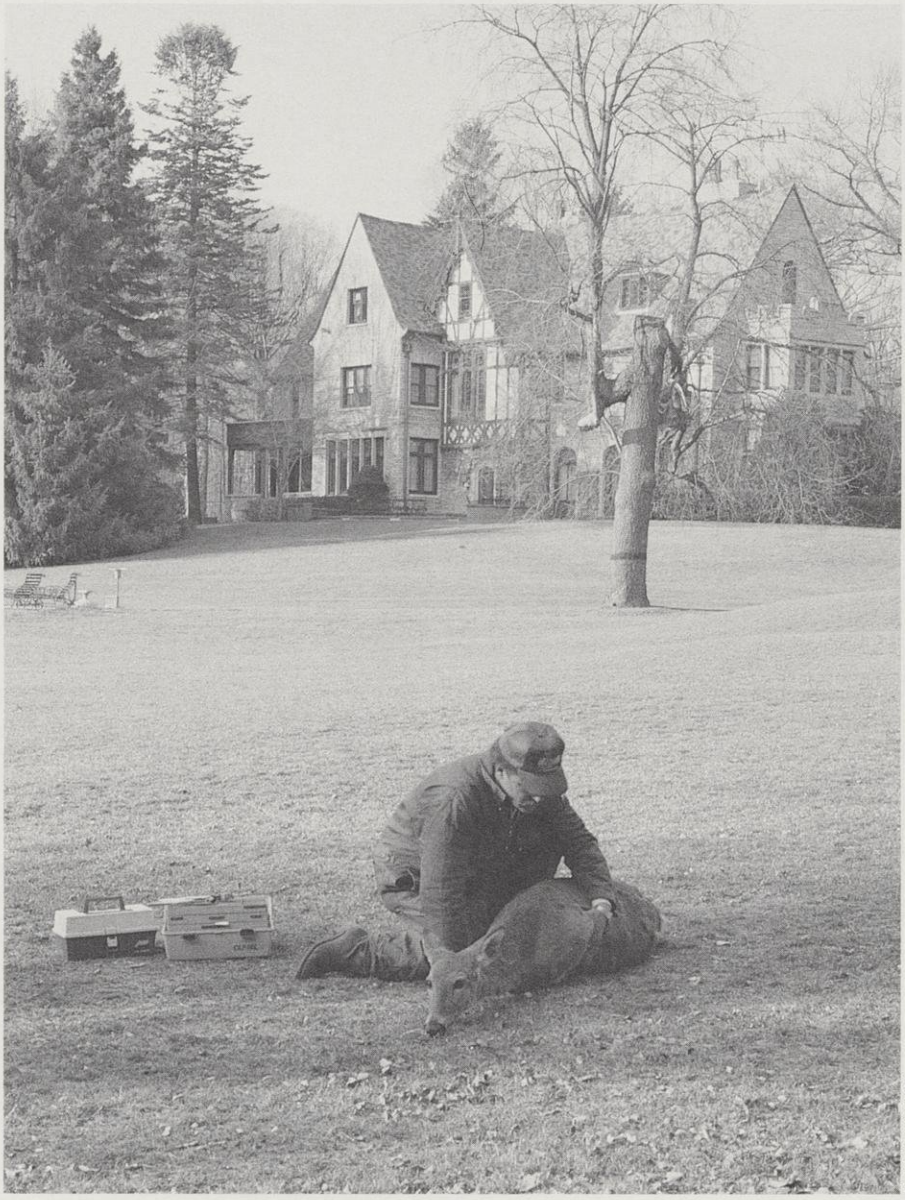
After the ospreys left the scene, I went out in the boat to examine the carp. The birds had eaten a big chunk of meat from the back below the dorsal fin. The fish was 26½-inches long and must have weighed nine pounds live. The feisty osprey could only have weighed about 4½ pounds. ■

George S. Bachay, retired DNR warden and game manager, contributes articles, photos and artwork from Albany, Wis.

IN A RUT

The pressures from urban deer herds have whitetails and city managers locking horns.

Tranquilizing and moving deer from the city seems humane, but it's expensive. A suburban Milwaukee community spent $400 per animal to move 44 deer. Within a year, half of the transplanted animals died in car collisions or were taken by hunters.



WILLIAM E. ISHMAEL

William E. Ishmael

Morning blues give way to streaks of yellow as the sun starts to warm up an October day. A business executive finishes a cup of coffee, puts down the morning paper and heads out the door to work. The driveway is a little slippery as the evening frost melts into wet, decaying leaves. Driving down the quiet suburban street, the daily commute begins and the executive's thoughts drift to the day's schedule.

Suddenly a large brown form darts from the roadside brush into the vehicle's path. The driver is jolted from the daydream and has little time to jam on the brakes. The car fishtails. The tires screech. The driver feels and hears a dull thud as the car collides with whatever was struck. A neighbor's dog? A child? An early-morning jogger?

Trembling, the motorist gets out of the car. Pieces of the car grille and headlight litter the street. What looks like a piece of reddish brown fur is lodged in the fender. Across the road lodged in a hedge, the crumpled body of a young deer lies still. Mercifully, the impact of the auto killed the animal instantly. The shaken driver gets back in the car, pulls it to the curb and walks down the sidewalk to a phone that will bring the police and a tow truck.

Unfortunately, this scene is becoming all too common across suburban America. From Ipswich, Massachusetts to San Francisco Bay, deer

populations are rapidly growing in suburban and other unhunted areas. Sprawling developments coupled with rising trends to build or preserve parks and green space are creating islands of ideal deer habitat. Protected from predators and other mortality factors including hunting, urban deer populations are increasing, creating a new challenge for neighborhoods and resource managers alike.

Historically, white-tailed deer inhabited large tracts of rural lands in the upper Midwest. Now major metropolitan areas around Chicago, Minneapolis, Milwaukee and Madison are also home to growing deer herds and the thrills and problems these herds create.

Wildlife add immeasurably to the attractiveness and quality of life in any community, but overabundance can lead to problems. Our attitudes about the "cute deer" and "backyard Bambis" change as deer numbers increase at the expense of gardens, expensive ornamental shrubbery and neighborhood traffic safety. As deer herds strain the social fabric of their new turf, communities are trying many strategies to manage these wildlife "gangs" in metropolitan neighborhoods.

How deer become trouble in town

Deer, especially white-tailed deer, adapt readily to changing landscapes. Whitetails thrive in nearly every habitat type from coastal salt marshes to black spruce forests. Still, you may

There goes the neighborhood! Growing urban deer herd keep dispersing into new territories along roadsides, railroads and undeveloped routes. Suburban areas provide food, shelter and no natural predators. In the absence of human controls, the deer population can skyrocket.

GERALD C. JOHNSON

wonder how so many deer survive in urban environments. You might think once the bulldozers move in, the deer move out, but that "ain't necessarily so."

Deer in the Midwest are generally non-migratory, they don't move great distances in large numbers as, for example, caribou do. Southern Wisconsin deer, in particular, tend to be homebodies. Most live the majority of their lives within the same square mile where they were born.

Like any appreciative homesteader, when conditions look good, deer settle right in. Protected from predators and surrounded by food, deer are prolific breeders; it's in their genes.

In wilder places and in tougher times, deer evolved a tremendous reproductive capacity so the herd would survive when threatened by predators, severe weather, wildfires and starvation. On good range, nearly all adult does will give birth to twins each year; some even bear triplets. On the best range, up to 60 percent of the one-year-old does will also produce a fawn.

How quickly can deer populate new territory? Six deer were let loose in a fenced enclosure on Michigan's George Reserve. Less than six years later the population had grown to 160 deer!

Big, bruising bucks are a striking sight, but socially, deer are raised by strong mothers. Adult does are typically the dominant animals in the herd. When fawns are born in May and June, the adult does drive off the youngsters from the previous year. These one-year-olds are forced to disperse into new areas. Dispersal spreads the herd into new territory, reduces the likelihood of disease spread among crowded groups, and is thought to reduce chances of inbreeding. In this way, small numbers of "pioneering" deer will begin to occupy territory which few, if any deer, formerly inhabited.

left: Deer evolved as prolific breeders to survive harsh weather, predators, fire and starvation. In the protected suburban environment, whitetails can overpopulate their range.

MARK S. WERNER

If the new habitat is good, the animals stay and begin producing families of their own; slowly at first, then at alarming rates. The population curve skyrockets.

If suburban sprawl in rural areas surrounds an existing deer population, the herd randomly disperses, in the new urbanizing area, typically along undeveloped routes like rivers and railroad corridors. The human neighborhood grows, but the deer remain creatures of habit. Once the urban herd establishes, young deer will disperse each spring, pioneering adjacent urban areas, extending their home range, and perpetuating the urban deer tradition.

Wisconsin can support larger, more productive deer herds. The herds grow quicker and expand faster. However, many more people live in southern and central Wisconsin, and they have limited tolerance for crop damage and car-deer collisions. This so-called "social or cultural carrying capacity" is typically lower than the herd size the habitat could actually support.

In recent years, deer herds in parts of southern Wisconsin ate heavily into the profits of vegetable and tree farms. Several years of intensive hunting were needed to reduce the herd size.

For example, in 1954 only 37 deer

GERALD C. JOHNSON

Mother knows best. Adult does dominate the deer herd. Each spring, does drive off youngsters from the previous year so the spring fawns will have less competition for food.

Deer populations follow predictable patterns

On the forested ranges of northern Wisconsin, deer populations are managed to maintain a balance with their food supply (the biological carrying capacity). The goal is to maintain fewer animals than the maximum the range could support for a short time to keep the deer from destroying their habitat or dying of starvation during extremely cold winters with deep snows.

Less harsh winters and widespread agriculture in central and southern

were killed by hunters in Iowa County; in 1984, hunters took 13,239 deer from the same county. These record-high harvests reduced the deer herd to the social carrying capacity in many areas.

Wildlife biologists set harvest quotas each year to maintain these herd levels while providing recreational hunting we've come to enjoy in Wisconsin. Societal changes precluded the deer's natural predators from much of their former ranges; consequently, sport hunting has become the most important, selective and economical method of keeping deer populations in check.

But hunting isn't feasible every-

GERARD FUEHRER

The dispersed herd pioneers new territory which could include vacant fields, gardens and backyards in suburban areas.

where. Around cities, huge areas can be closed to deer hunting when firearm shooting is generally banned for public safety purposes.

Without the benefit of hunting, municipal officials must start planning deer control programs before either human or deer populations grow significantly.

People react to deer in predictable patterns

Growing urban deer populations follow telltale patterns in each community: A few pioneering deer move in, which thrills nearby people. Many folks start feeding deer to attract them to backyards. Browsed gardens and ornamental shrubbery beds are the first signs of a growing herd. Next, deer are commonly seen crossing streets and darting between cars, jeopardizing traffic safety. Then, communities erect "deer crossing" signs. People start fencing in their gardens, hanging bags of hair or trying chemical deterrents to dissuade deer from prized flowers and bushes. Meantime, the herd continues to grow.

More recently, people are concerned that deer are bringing deer ticks and Lyme disease closer to people. Community debates about "the deer problem" start. Most people agree controls are needed, but few agree which methods should be tried and even fewer want to pay for deer control.

Deer control methods vary, but controlled shooting seems most effective

During the relatively brief time urban deer have stirred controversy, many control methods have been proposed.

Regulated hunting is an historical, economical, effective way to control deer herds while providing food and recreation. Conservation agencies

cite hunting as the only practical way to control deer populations over a widespread region. Statewide, deer gun hunters harvest approximately 250,000 of an estimated 900,000 deer each year during a nine-day season each November. Herd control on this scale would be impossible by any other means save an environmental catastrophe. Harvest quotas give wildlife biologists a tool for matching herd size, sex and age structure to carrying capacity in a given area. In spite of these ecological, societal and recreational benefits, we recognize that large-scale hunting may not be practical in urban settings.

As an alternative, people often suggest live-trapping and relocating deer. Practically speaking, live-trapping, netting or chemically immobilizing deer and moving lots of them is neither an easy nor an economical control method. It takes lots of time, lots of people, lots of equipment and, consequently, lots of money. Studies show that deer relocation in the UW Arboretum in Madison and Angel Island in San Francisco cost about $400 per animal. Similar programs on New Hampshire's Long Island and in suburban Chicago cost $800 and $1,000 per animal. And rarely are enough deer captured to put a dent in the local population.

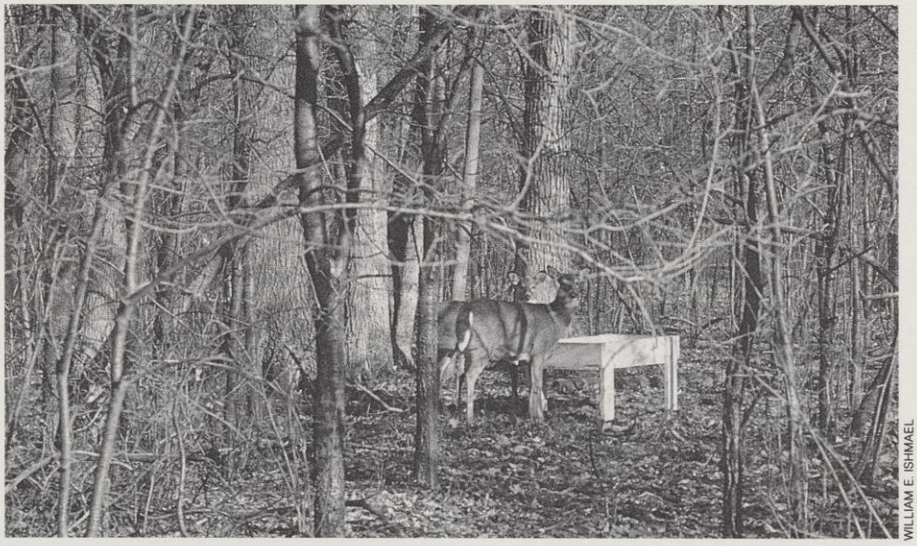
Then there's the matter of finding another suitable location for the deer. The notion that transplanted deer can be readily released on new range is a fable. There are very few areas near our urban centers that are not already populated with whitetails. Relocation to licensed deer farms is possible, but these animals will not live a pastoral "life of Riley." Most deer farms have plenty of deer and the transplants might be traded to another deer farm for breeding stock, penned in an exhibit or sold to a commercial venison processor.

Trapped deer are also susceptible to injury and "capture-stress disease." The stresses of capture, crating, shipping and relocation to unfamiliar turf can kill a seemingly healthy deer when released. Aside from stress, deer relocated to different areas easily fall prey to dogs or wander onto unfamiliar streets and highways.

Studies of relocated deer eartagged before release in California, New Mexico and Florida showed that 85 percent, 55 percent and 58 percent respectively survived from four to 15 months after release.

In the Milwaukee suburb of River Hills, 44 deer were captured and relocated during the winter of 1987-88. Relocation cost about $400 per animal. All captured deer were marked with ear tags before release. Within a year, half of the animals had been killed by hunters or car collisions. Several of the herd were badly disoriented and wandered as far as 55 miles from their release site.

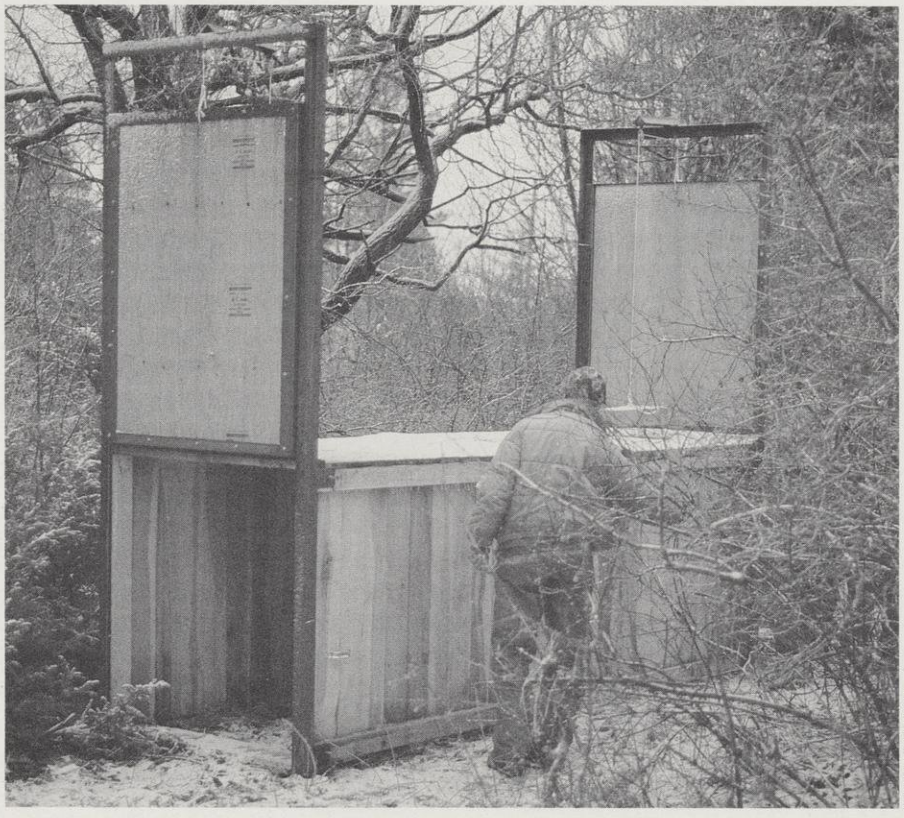
Last winter, the same community



WILLIAM E. ISHMAEL

top: A feeding station in River Hills lured deer to an area where a trap would be placed later in the season to transplant the growing herd.

bottom: Trapped and transported deer can be injured or suffer "capture-stress disease," a potentially-fatal side effect of human handling.



WILLIAM E. ISHMAEL

relocated 122 deer from a herd estimated at 320 individuals. Deer were moved about 40 miles and, again, all relocated deer were ear-tagged. Generous funding from Whitetails Unlimited Inc. and the Safari Club International - Wisconsin Chapter enabled DNR wildlife biologists to tag 12 of these deer with radio transmitters to track their movements.

Within a week, two of the deer died near the release site (presumably from capture-stress disease). Within two months, a third deer was killed by a car. Some of the radio-tagged deer traveled more than 20 miles toward their original home range. Others have been pinpointed in urban areas at least 25 miles from their rural release sites. Wildlife managers conclude that small numbers of deer or enclosed herds may be successfully relocated, but this method is impractical for managing free-ranging deer herds.

Others suggest controlling herd sizes by using contraception methods such as synthetic hormones or surgical implants. Studies on penned deer and feral horses show variable results. These methods reduce individual fertility but haven't proved practical for controlling wild herds. Aside from the moral and humane questions of fertility controls, approximately 70 - 80 percent of a large herd would have to be treated to effectively reduce the population. While hunting removes both a deer and its potential offspring, contraception solely prevents offspring, so roughly twice as many animals would need to be treated, as opposed to removed, to achieve the same result.

Some people recommend letting "nature take its course." Human population growth has so changed the environment, reduced predators and changed food supplies that deer populations can quickly reach their upper limit. Historically, deer populations that grow too large, too quickly are in poor health and are prone to violent fluctuations and catastrophic losses. Moreover, densely-populated deer herds cause irreversible changes to vegetation and other wildlife species inhabiting the same area. Ignoring these concerns will not make them go away.

Controlled shooting stirs up controversy since it appeals to neither the sporting hunter nor the nonhunting public. In places where deer herds are surrounded by homes and city streets, a regulated public hunt may be impractical, but tightly-controlled selective shooting by safety-conscious sharpshooters can effectively keep a deer herd in check. This technique has been used safely and successfully in the UW-Madison Arboretum, a Chicago forest preserve and other urban settings where deer herds exceed biological or human tolerances.

MARK WALLNER

Whether hunted, transported, treated with birth controls or harvested by sharpshooters, many suburban communities need to weigh options for controlling deer herds' growth before the animals cause extensive damage.

Back in 1982 and 1983, the UW wildlife ecology staff studied the cost and effectiveness of six methods of controlling deer. The 1,200-acre arboretum is bisected by a major highway and surrounded by suburban development. Moreover, the arboretum is a haven for bicyclists, cross-country skiers, runners, researchers and birders, and is adjacent to the local zoo. A growing deer herd was feasting on rare shrubs, grasses and trees but it would have been difficult to conduct an open, public hunt. Controlled shooting proved most practical for removing deer while keeping most of the property open to the public. All deer shot under these strictly controlled conditions are sold to the public or donated to the needy.

Deciding when the buck stops here

Wherever and whenever deer populations wander in urban areas, controversy surely follows. Each community balances the joys and values of attracting wildlife against the damage a large deer herd can cause.

We should remain mindful that the complicated mix of community development and consequent fluctuations in wildlife populations don't just happen. . .people *make* them happen. Wildlife follow their instincts, but people make choices that profoundly change the whitetails' search for food and shelter. Options for determining how many deer the community will tolerate, slowing the herd's growth or removing deer will be hotly debated. When cooler heads prevail, communities manage urban deer herds by leaving some lands undeveloped and by choosing control options which are ecologically sound, economical and practical. ■

William E. Ishmael is a DNR Wildlife Manager stationed at Pike Lake State Park in Hartford. He's a member of a DNR team forming strategies for managing urban deer herds.

1989 HUNTERS' ALMANAC

New 1989 hunting rules

DAVE GJESTSON,
Wildlife Staff Specialist

New hunting rules that take effect this fall are highlighted below. For a more complete explanation, pick up a hunting regulations pamphlet where you purchase your hunting licenses.

Herb Lange

1. Uniform hunting hours — Whether hunting for big or small game, hunting hours will start at a standard time, 30 minutes before sunrise, and close 15 minutes after sunset. However, during the spring turkey season, hunting hours will continue to close at noon daily. Waterfowl hunting hours will remain from sunrise to sunset to remain consistent with federal rules.

2. Bow casing — Bows don't have to be unstrung or cased after shooting hours end. However, hunters are reminded that the standard hunting hours apply to *archery hunting of all species* during the bow deer season.

3. Firearm options — The use of shotguns or rifles for gun deer hunting has been modified as follows:

a. Buffalo County - The portion of unit 59B north of U.S. Highway 10 is open to rifle use.
b. Chippewa County - The portion of unit 59B west of U.S. Highway 53 and south of State Highway 40 is open to rifle use.
c. Pepin County - The entire county is restricted to shotguns the first two days of the gun deer season; rifles may be used thereafter.

4. Deer season — The nine-day gun deer season for unit 74A in La Crosse and Vernon counties and unit 74B in Crawford and Vernon counties is restricted only to buck hunting.

5. Management unit boundaries — The maps to the right indicate new deer management unit boundaries.

6. Bow deer registration — Archers have three days to register bow-killed deer. Until registered, these deer may only be transported on state or federal highways if moved out of the county where harvested.

7. Sharptail limits — One sharp-tailed grouse may be taken each day. The possession limit is two birds.

8. Canada goose hunting — A permit is again required to hunt Canada geese anywhere in Wisconsin. Remember to attach the goose stub from your license when applying for a Canada goose permit.

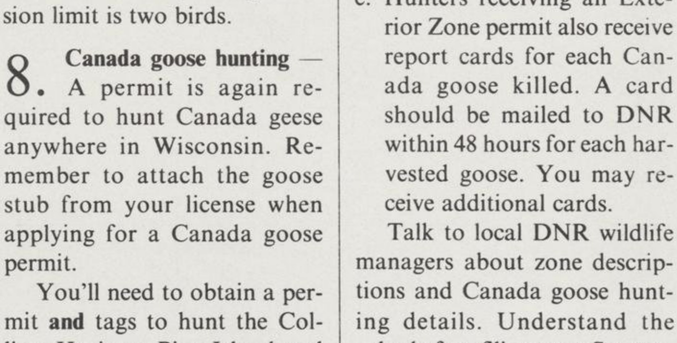
You'll need to obtain a permit **and** tags to hunt the Collins, Horicon, Pine Island and Theresa goose management zones. The application deadline for permits and tags in these zones is September 8. Applications will be accepted through the mail only.

The region outside the Collins, Horicon, Pine Island or Theresa tag zones that includes Brown County, New Auburn, Rock Prairie and Mississippi sub-zones is called the "Exterior Zone" and you'll only need a permit to hunt there. Other important features of this year's hunt follow.

a. You may only hunt one zone.
b. After September 8, only permits for the Exterior Zone will be available; apply at DNR offices.
c. Hunters receiving an Exterior Zone permit also receive report cards for each Canada goose killed. A card should be mailed to DNR within 48 hours for each harvested goose. You may receive additional cards.

Talk to local DNR wildlife managers about zone descriptions and Canada goose hunting details. Understand the rules before filing your September application.

(left) Western boundary of Unit 54B has expanded to the County N and County W line. (right) Unit 70B has split roughly in half, creating a new unit 70G.



Season dates and outlook

SPECIES	1989 LOCATIONS AND DATES	HUNTING PROSPECTS
bear	statewide with bait (bow and gun) Sept. 16- Oct. 6. North zone only with dogs (bow and gun) Sept. 9-29.	very good, best in northern counties
bobwhite quail	statewide Oct. 14-Dec. 6	poor to fair, best north of the Wisconsin River in southwestern Wisconsin
Canada goose	statewide dates available after Sept.15	excellent, best in east central Wisconsin
cottontail rabbit	North: Sept. 16-Feb. 28 South: Oct. 14-Feb. 28	poor to fair, best in southern two-thirds of state
coyote	statewide open all year except in Restricted Area of northern Wisconsin (see p. 19 of hunting regulations) season is closed Nov. 18-26	good, best in northern Wisconsin
deer	gun: statewide Nov. 18-26 bow: statewide Sept. 16-Nov. 12, Dec. 2-31	excellent in most areas, best trophy hunting opportunities in northern Wisconsin
ducks	statewide dates available after Sept. 15	poor to fair, best hunting along the Mississippi River and in eastern counties
gray and fox squirrel	statewide Sept. 16-Jan. 31	very good, best in southern two-thirds of state
Hungarian partridge	statewide Oct. 14-Dec. 6	poor to fair, best in counties near Lake Winnebago and Lake Michigan
pheasant	statewide Oct. 14-Dec. 6	poor to fair, best in southeastern quarter of state
raccoon	statewide for residents Oct. 14-Jan. 31 statewide for nonresidents Nov. 4-Jan. 31	excellent, best in southwestern and west central Wisconsin
red and gray fox	North: Oct. 14-Jan. 31 South: Nov. 4-Jan. 31	good, best in western and southern Wisconsin
ruffed grouse	North: Sept. 16-Dec. 31 South: Sept. 16-Jan. 31	very good, Best in northern and western Wisconsin
snowshoe hare	statewide open all year	good, best in northern Wisconsin
turkey	Fall: eight zones and three hunting periods from Oct. 11-29 Spring: 19 zones and six hunting periods April 11-May 20	very good, best in southwestern Wisconsin
woodcock	statewide Sept. 16-Nov. 19	very good, best in northern third of state

A reminder about crows

Crows are protected nationwide. In Wisconsin, crows may only be shot when they are a proven nuisance — causing or about to cause damage to crops, trees, livestock, wildlife or when large numbers of crows present a health hazard or nuisance. Calls and electronic devices to attract crows are prohibited in Wisconsin.

Watching Wisconsin's wildlife

MARY KAY JUDD,
Wildlife Education and Communication Specialist

Tracking and reading signs left by wildlife takes skills that rival any mystery gumshoe. To deduct and decipher what nibbled this twig, what rubbed the bark off that tree trunk or what left telltale paw prints in the mud adds immeasurable enjoyment to your outdoor wanderings. It turns a walk into a stalk; a hike into an adventure.

In fact, the "sport" for seasoned hunters and trappers often lies in using their knowledge of wildlife habits and their honed skills in recognizing signs to find their quarry. Even an empty bag at dusk is not the measure of a "successful" day for them.

We can help you make the same journey. If you would like to learn more about watching Wisconsin's wildlife — **how to do it and where some of the best stalking spots are** — order our special Watchable Wildlife issue of **Wisconsin Natural Resources**. Watchable Wildlife is a 72-page guide to the hot spots for viewing Wisconsin's wealth of wild things, complete with maps, a poster and outstanding wildlife photos. It makes an excellent gift or stocking stuffer. For each copy, send $2.00 to: DNR Bureau of Wildlife Management, Box 7921, Madison, WI 53707.

A farm program for wildlife? You bet!

TODD PETERSON, *Agricultural Wildlife Specialist*

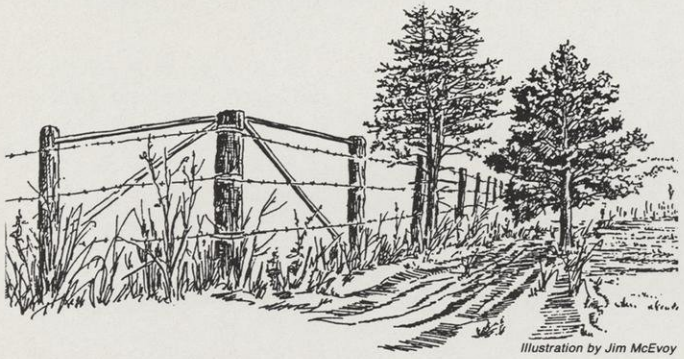


Illustration by Jim McEvoy

The Conservation Reserve Program (CRP), designed to save soil and bolster sagging crop prices, is producing major side benefits for wildlife. The program offers participating landowners strong incentives to restore habitat that is critically important to farmland wildlife species.

Wildlife managers believe the CRP will especially help ring-necked pheasant, blue-winged teal and bobolink. Their populations declined dramatically during the last few decades as choice grassland habitat went under the plow and hay was cut earlier during the birds' nesting season.

Under the CRP, farmers will be reimbursed for half their costs in transforming cropland that could erode into grassland, wetland or forest cover. Landowners receive up to $90 in rent per year for 10 years for each acre enrolled in the program.

Landowners can also get free, professional advice from DNR wildlife managers to improve habitat conditions for wildlife species on lands set aside in the CRP. Managers may suggest which grasses, shrubs and trees provide wildlife food or cover; plan locations for these food and cover patches; and draw up plans for restoring wetlands that have been tiled and drained. In fact, the CRP shares the costs of these improvements.

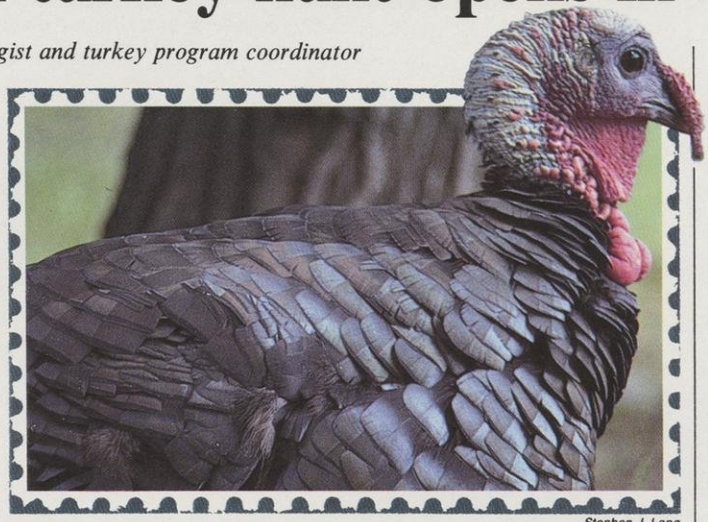
CRP has been popular among Wisconsin landowners and a recent program change should further boost participation. Farmland wetlands (cropped fields with some wetland characteristics) are now eligible for enrollment. The reliable CRP payments may outweigh the risks of having even one crop failure during the next 10 years. Once restored as wetlands, these wet fields can be a boon to wildlife.

Local Agricultural Stabilization and Conservation Service (ASCS) offices accept CRP applications about every six months. The next sign-up period is expected in February, 1990. Contact ASCS for more information.

Hunter's Almanac is produced by the DNR Bureau of Wildlife Management. Mary Kay Judd, Issue Coordinator.
PUBL-WM193 (89)

First fall turkey hunt opens in October

ED FRANK *Upland Wildlife Ecologist and turkey program coordinator*



Stephen J. Lang

For the first time this century, Wisconsin hunters can rekindle the spirit of America's most traditional fall hunt . . . bringing home a wild Thanksgiving turkey. More than 7,000 lucky applicants will receive permits to hunt during one of three consecutive Wednesday-Sunday hunting periods, Oct. 11-15, Oct. 18-22 and Oct. 25-29. Eight zones of the wild turkey's range are open for this first fall hunt. I'm predicting about 20-25 percent of the permit holders will bag a turkey.

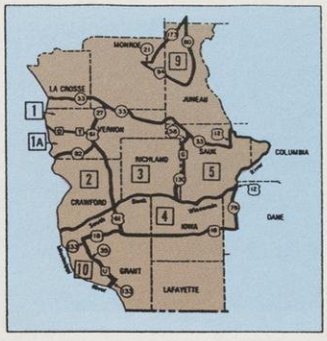
Permits will be mailed to successful applicants for the fall hunt after September 18. Permit holders will also need to purchase a hunting license — 1989-90 small game, sports, patron or archer's — and a 1989-90 Wisconsin Turkey Stamp. Both are available at DNR offices and county clerk offices; some sporting goods stores sell the licenses.

Your application for a fall turkey permit does not affect your chances of getting a permit for the spring hunt next year; just submit your application for the spring hunt by the November 3 deadline.

Fall turkey hunting rules are quite different from spring turkey hunting. Unlike the spring hunt, turkeys of any age or sex can be legally hunted during the fall hunt; only eight zones are open to hunting this year; hunting hours begin a half hour before sunrise and end 15 minutes after sunset; and turkeys have to be registered by 5 p.m. on the day after your hunt.

Fall hunting techniques are also very different from those used during the spring hunt. Look for roost sites near feeding areas along field edges, near berry bushes and where oaks drop abundant acorns. Adult gobblers bunch in small flocks. Hens still are surrounded by larger broods of young birds. The young jakes form their own groups in late October. Fall strategies include scattering these small flocks the night before your hunt and calling them back during the morning hunt. The technique is more fully described in DNR's pamphlet *Fall Turkey Hunting in Wisconsin,* obtainable from DNR offices or by writing to DNR, Wildlife Management, Box 7921, Madison, WI 53707-7921. Successful applicants for the fall hunt will get a copy with their permit.

Whether you're a fall or spring turkey hunter, I suggest you attend one of the turkey hunter education clinics held throughout the state each spring. Clinic graduates not only hunt more safely, but their superior understanding of turkey habits and practice in calling-in birds increases their chances of bagging a bird.



The 1989 Pheasant Management Plan

CHARLES PILS *Chief, Wildlife and Landscape Ecology Section*

The ring-necked pheasant, one of Wisconsin's most popular upland game birds, is getting help. A new plan formed by DNR wildlife managers, researchers, wardens and a member of Pheasants Forever aims to increase wild pheasant populations and hunting opportunities that have dipped in the 1980s.

During the last 40 years, a combination of intensive agriculture; the demise of the soil bank program; wetland drainage; earlier hay mowing; destruction of fencerow cover; urbanization; predation from hawks, owls, foxes, skunks, and raccoons; along with severe winters and wet springs depressed pheasant populations.

Pheasant managers identified these problems and developed strategies for rebuilding pheasant populations:

Challenge #1 — Accurately map pheasant distribution statewide by 1990. Moreover, identify those counties and areas where management is most likely to improve pheasant populations.

Challenge #2 — Offset losses from intensive agriculture, decreasing nest cover, decreasing winter cover, loss of strip cover, severe weather, and earlier hay mowing. Strategies will include:

- working with other state agencies to further encourage multi-year set-aside programs that will increase pheasant nesting cover.
- supporting multi-year set aside program in the 1990 Farm Bill.
- using the state Stewardship Fund to purchase thousands of acres of pheasant nesting habitat.
- buying lands that provide prime winter cover.
- working with landowners to grow food plots on private land.

Challenge #3 — Study how pesticides, toxics, pheasant stocking, predators, illegal harvest and game farms impair wild pheasant populations. Investigations aim to resolve these questions:

- Does pesticide use change pheasant reproduction and survival?
- Can predators be effectively controlled by methods other than hunting, trapping and chemicals? Aversion conditioning and electric fences will be tested.
- Should hen shooting be banned at game farms that raise pheasants in areas where wild pheasants reside?
- Can we successfully raise wild pheasants at the Poynette Game Farm?
- Will offspring of these wilder stocked birds thrive in high quality habitat?
- How do stocking rates and pheasant abundance relate? Is stocking of DNR-raised and game farm-raised pheasants detrimental to wild bird abundance in the pheasant range?
- Will increasing poaching penalties protect more pheasants?

Challenge #4 — Research the effects of current pheasant policies:

- Evaluate pheasant management on private lands and scattered public lands.
- Evaluate if stocked birds change wild pheasant genetics.

Herb Lange

Common hunting questions

RON GROENER, *Wildlife Information Assistant*

Frequently, you ask us to explain how hunter's choice applications should be completed. It works this way: A hunter's choice permit application is attached to each deer hunting license. Every deer hunter does not automatically receive a permit, but any hunter may apply for a permit in any deer management unit. Your chances of receiving a permit strictly depend on how many permits are available for that unit and how many other hunters have applied for permits in that same unit.

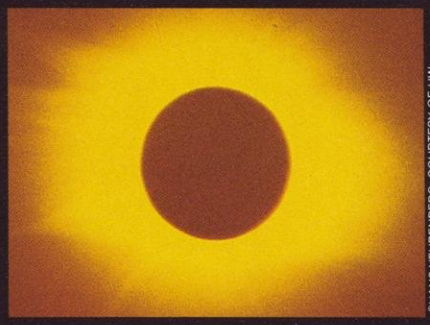
To more equitably distribute permits, landowners who apply for hunter's choice permits on their property are given preference for permits, provided their applications have been properly completed. To qualify for landowner preference, you must own at least 40 acres of land and your application must list the legal description (township, range and section) of your property that is contained in or adjoins the deer management unit for which you are claiming preference.

Answer the questions asking if you applied for a hunter's choice permit last year. Also, note whether you received a permit last year. Finally, remember to sign your application. You'd be surprised how many people carefully fill out their applications, check them and forget to sign them.

In deer management units where DNR issues more permits than applications received, the department offers opportunities for a "bonus tag" giving hunters a chance to hunt a second deer. Once each applicant in the unit has been issued a hunter's choice permit, the "bonus" tags, awarded by chance, allow harvest of antlerless deer only. These tags may be used in any order.

Lots of callers assume public hunting grounds are specifically designated for sighting-in firearms. In fact, the public hunting grounds are **not** designed as target ranges, rather they are places where anyone can enjoy hunting or watching wildlife. Local gun clubs, sporting associations and sheriffs' offices can provide contacts who manage ranges designed for sighting-in firearms.

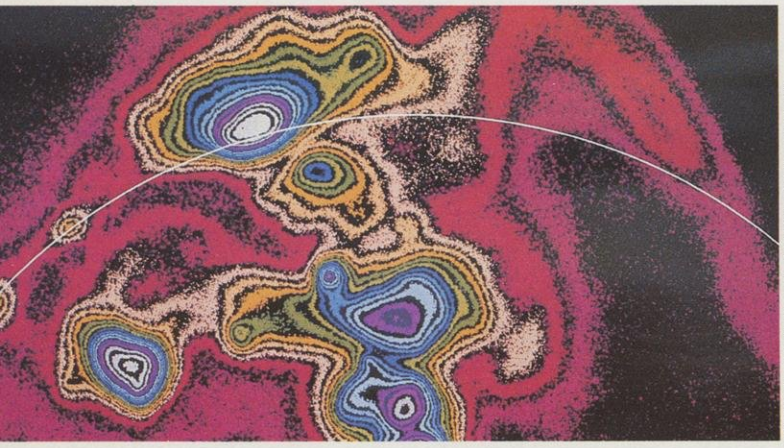
The DNR Bureau of Wildlife Management provides a free map showing the locations of public hunting grounds and describing the game species typically found at each site. Write to us at Box 7921, Madison, WI 53707 or call us at (608) 266-1877.



SUN DAZED

Total solar eclipse June 30, 1973

bottom: How do solar flares, like this helium eruption photographed by the Skylab satellite, disrupt ground communications? Read on!



COURTESY OF UW-MADISON DEPARTMENT OF ASTRONOMY

Editor's note: What, you may ask, does a telescope searching for black holes, white dwarfs and galaxies 320 nautical miles above the Earth have to do with Wisconsin's resources? Plenty. First, this is a tale of home-grown technology that will monitor our interstellar environment. Second, it reminds us that all human inventions, even our sophisticated electronic gizmos, are subject to natural forces and must survive in a natural world. The signals that allow us to see across the world and talk clearly across the oceans are still subject to the natural cycles of sun and atmosphere. As recounted by mountain climbers and astronauts, the most miraculous aspect of any lofty voyage is not the view upward and outward, but the insights and reflections downward on the fragile thin layers of air, water and soil on which we survive.

ARTIST'S RENDITION BY BRIAN SULLIVAN. COURTESY OF UW-MADISON DEPARTMENT OF SPACE ASTRONOMY.

Quincy Dadisman

Astronomers around the world are glaring back at the sun this fall. They're afraid Old Sol is going to send 10 years of their best work down the drain next March.

Usually, it's pretty hard to upset astronomers. They are used to thinking on a grand scale; and staying cool under pressure because they seldom have any control over the events they observe.

But the Northern Lights threw a big scare into them last November. And, in March:

"There was a huge flare on the sun which caused the aurorae to be seen much farther north and south than usual," astronomer Robert Bless of the University of Wisconsin-Madison said.

Bless said astronomers see the solar fireworks as a threat to the Hubble Space Telescope, an electronic eye far above the atmosphere now scheduled to be launched from Cape Canaveral next March. They fear that by March the solar shenanigans will have boosted the density of the upper atmosphere so much that it will be difficult to aim the telescope.

Sun flares typically last no more than a few hours, but a large flare may release the energy equivalent of a two trillion megaton bomb, Bless said.

top left: As bright as the sun appears, we can't see most of the energy it releases. Skylab took this color-enhanced X-ray photograph of the coronal loop.

bottom left: Solar activity this year could delay the launch of the Hubble Space Telescope.

"They are really immense, energetic events by our standards," he notes. "Since the earth's atmosphere gets a small part of that energy, the upper part of the earth's atmosphere heats up, expands and becomes denser at higher altitudes. When that energy — streams of electrons and neutrons — reaches the upper atmosphere, it sets off electronic light shows around both poles."

The aurora borealis (in the northern hemisphere) and the aurora australis (in the southern) — the Northern and Southern Lights — become brighter and move closer to the equator in response to increased intensity of solar flares.

The Space Telescope could answer questions astronomers have been asking for centuries: Do other stars have families of planets like the sun? Can we glimpse debris falling into a black hole? What is way out there near the beginning of creation?

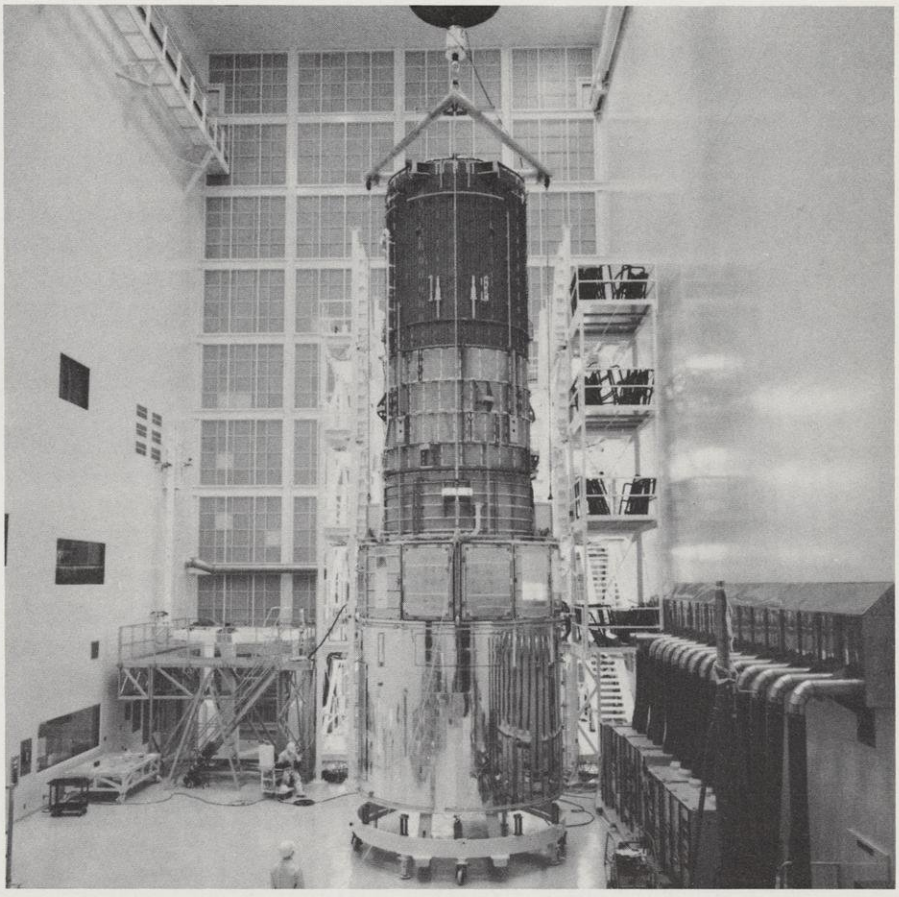
The telescope is also something special in scientific history: If the Space Shuttle launches it into orbit as planned, 320 nautical miles above the Earth, astronomers will see the stars 10 times as well as they can now through any optics on the surface.

The Space Telescope will be above more than 99.999 percent of the atmosphere and its 2.4-meter mirror — the most nearly-perfect astronomical mirror ever made — will have 120 times the resolution of any earth-based telescope.

It will be so well-balanced that it will be able to hold its aim on an object the size of a quarter 300 miles away without wavering the width of the quarter.

That's many times steadier than earthbound scopes with the best foundations. Astronomers with the sniffles aren't welcome in most observatories; a healthy sneeze could jiggle the optics.

There are other technological firsts. The Space Telescope will be the most massive payload and will be taken to the greatest altitude of any satellite ever carried by the shuttle. Filling the shuttle's cargo bay, the



COURTESY OF LOCKHEED COMPANY

The Space Telescope under construction at Lockheed Company. Orbiting 320 nautical miles above the Earth, the 25,000-pound celestial gazer could be difficult to aim as solar flares and sunspots expand our atmosphere.

Sun outages

Solar flares and sunspots cause very little problem with satellite communications because the beam of the antenna is so narrow, according to Marshall Poole of Consumer Satellite Services.

His company's headquarters in Cross Plains is surrounded by huge dish antennas aimed at satellites peeping over the southern horizon.

A flock of more than 50 satellites soars 25,000 miles above the equator, in effect holding their positions because they are falling as fast as the Earth is moving out from under them.

However, twice a year, solar electromagnetism becomes a problem for cable television companies that depend on satellite links for their signals. At those times, the companies warn their customers to expect "solar outages."

Sun outages occur when the very narrow beam of the satellite dish antenna is focused on the satellite and the sun is directly behind the bird.

When that happens, there is so much solar noise all across the spectrum that it may black out the signal completely. At its longest, the blackout lasts 10 or 15 minutes a day, typically starting about noon.

The problem starts at a low level, becomes worse for a period of 10 days or so, then regresses gradually.

It's possible to calculate the problem time precisely for any spot on Earth.

"There's no need to notify the company," the warnings often say, "normal service will return in a few minutes."

25,000-pound telescope housing — 14 feet in diameter and 43 feet long — will barely leave room for two huge folded solar power panels to snuggle up close so the doors can be closed.

Bless helped design the Space Telescope and hopes to be able to use it. He has been disappointed several times when launching has been delayed, but he may call for another delay if the hyperactive sun continues to act up.

Sunspots will peak too

The flares are just one of several manifestations of increased solar activities astronomers have noticed lately. The most common index is the sunspot count — the number of dark spots on the bright face of the sun.

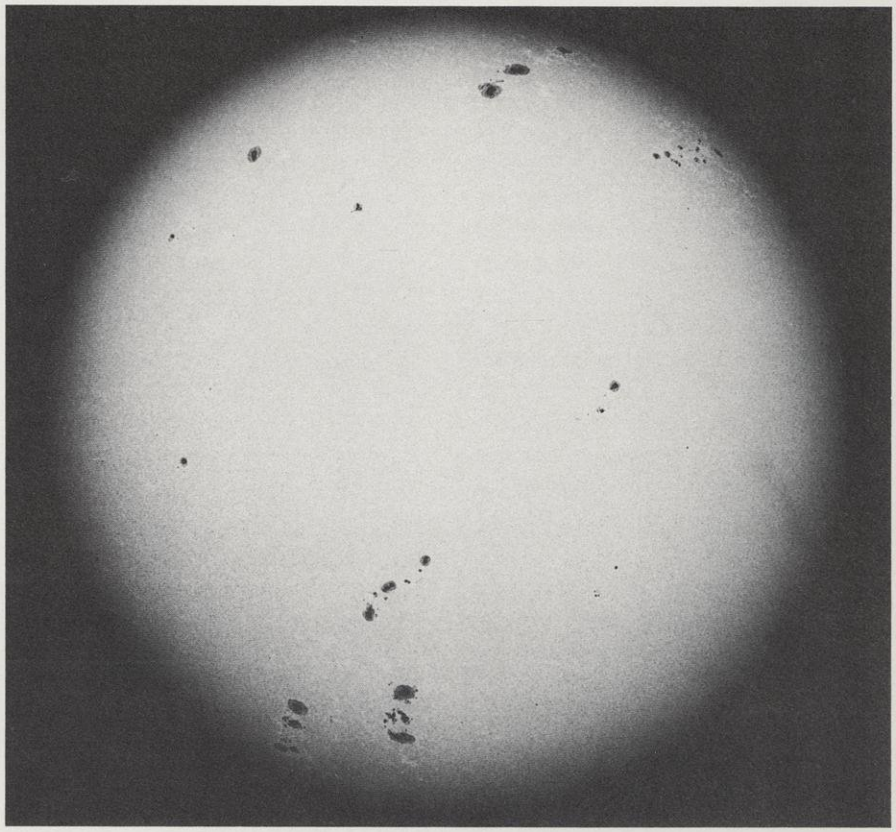
"We are approaching the maximum of the [roughly] 11-year sunspot cycle next year," Bless said. "This will be a strong maximum, probably the strongest on record.

"This means that all manifestations of solar activity will be at a peak over the next year," he emphasized. Moreover, peak activity lasts six months on average, but the previous solar cycle had an unusually broad peak that lasted a year. Bless believes "if we hit a peak next May or June, it will last all of next year.

"The trouble is, when we have a very high sunspot maximum, the upper atmosphere becomes much more dense. I'm afraid it may become so dense that it will be impossible to aim the Space Telescope accurately."

The orbiting telescope is moved by reaction motors whose drag increases in this denser atmosphere. As the drag increases, movement could become so difficult that astronomers believe the ground control station may no longer be able to aim the telescope.

A meeting in December will bring scientists involved in the Space Telescope project together to "take a look at the sunspot count."



SEPT. 15, 1957 PHOTO TAKEN AT MOUNT WILSON AND PALOMAR OBSERVATORIES. COURTESY OF THE UW-MADISON DEPARTMENT OF ASTRONOMY

Sunspots are "cool" super magnets that peak in power about every 11 years. The sunspot cycle peaks this fall and next spring potentially diminishing or enhancing radio and television signals on Earth on an irregular basis.

Solar cycles scramble ground communications too

The effects won't all be out in near space. Television viewers on Earth will know something is happening, although they may not blame the sun.

High energy electrons and protons — and x rays, gamma rays, and other atomic junk — streaming away from the sun bang into the uppermost layers of the atmosphere and ionize the atoms they find there. This ionosphere forms a sort of outer peel for the Earth.

As amounts of incoming electrons and positrons vary, they change the shape of the ionized layers — from 300 to 25,000 miles above the surface on the day side, many times that on the dark side. As its electrical structure is changed, the ionized layer begins to do strange things to radio and television signals.

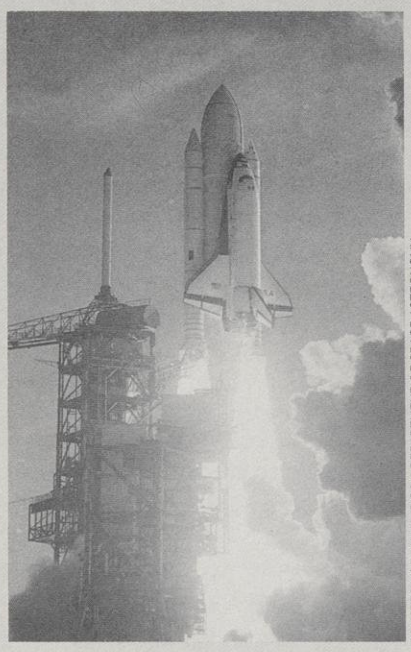
Sometimes communications go to pot completely. At other times, there are strange effects. Television watchers in Chicago see programs from a station in New Orleans; police radios in Milwaukee suburbs spout phrases in French intended for a squad car in Quebec.

Ironically, communication with the Space Telescope is unlikely to be affected by the solar soup. The radio frequencies it will use are so high that signals will probably penetrate the mess.

Sunspots are "cool" but magnetic

A non-scientist would guess that the sun is an immensely variable source of energy, but Bless notes the total "varies only slightly."

In fact, he said, the sun really emits a tenth of a percent less energy during solar maximums — when sunspot counts are highest — than during minimums. Sunspots appear dark be-



COURTESY OF UW-MADISON DEPARTMENT OF SPACE ASTRONOMY

Space shuttle

An experiment racing the clock

Solar activity and delays caused by the Challenger disaster could cost the National Aeronautics and Space Administration a long-term experiment.

The Long Duration Exposure Facility (LDEF) was put up by NASA nearly a decade ago to test the durability of different materials in a space environment, like paint testing strips sometimes smeared on highways.

The experiment has lasted a lot longer than expected because the LDEF was supposed to be recovered by the Space Shuttle, delayed by the Challenger disaster.

The LDEF is now slowly dropping in altitude. Even though most of the atmosphere is below it, a thin mix of gases remains. Whether NASA will be able to bring it back before it re-enters a dense layer of the atmosphere and breaks up depends on the sun.

A December shuttle launch is slated to retrieve LDEF, but last March's flare increased the density of the upper atmosphere so much that the lifetime of the LDEF has been reduced by a month or so.

LDEF is now expected to re-enter the atmosphere in January, giving NASA a one-month leeway.

Another big flare could doom the satellite.

cause they are about 1,500° Celsius cooler than the rest of the solar surface.

"They're still hot, by our standards, but they're cool compared with the rest of the sun," Bless said.

The exact mechanism that results in sunspots is still a puzzle to astronomers. Among the facts they do know:

The Earth has a magnetic field of 1/10 gauss (a measure of magnetic strength), barely enough to swing the needle of a compass, and the sun's magnetic field is relatively weak; overall about one gauss. By contrast, a sunspot measures about 1,000 gauss.

So sunspot activity is not connected with an increase in total energy radiated by the sun, but with changes in the magnetic field of the sun.

Solar flares are a different story, and a hot one.

Most flares cannot be seen in white light, so astronomers use the red light of hydrogen emissions to see them. But sometimes — when they look straight down on extremely energetic flares — astronomers can see a bright white light on the face of the sun.

The temperature in the corona, the outer envelope of the solar atmosphere, is typically about two million degrees. Above a flare, the corona temperature may be 20 million degrees, a tenfold increase. That triggers an immense increase in x rays, ultraviolet light and ordinary visible light.

What the telescope will see

The Space Telescope will primarily operate optically using ordinary light, but it also will detect x rays. Scientists are hoping to piece together many different kinds of information from the 100,000 bits of data it will collect each second.

"We hope to look at pulsars and see them pulse," Bless said. He also plans to join other astronomers in looking for planet-sized objects around some of the nearer stars, but, most of all, he will be looking for evidence of black holes.

The orbiting telescope is expected to have a 15-year lifetime. Astronauts will visit it every five years or so to replace some of the circuitry and recording equipment — the "black boxes" — and after 15 years, the shuttle is to retrieve it and return the whole package to Earth for renovation.

Construction was divided among four institutions, the University of Wisconsin-Madison the only school among them. The other four builders are basically research, rather than teaching institutions.

The instrument built at the UW is a high-speed photometer, a sort of electronic camera.

The Marshall and Goddard Space Flight centers will cooperate in launching and using the Space Telescope. ■

Quincy Dadisman covered environmental and state news for the Milwaukee Sentinel. In retirement, he continues to unravel the complexities of science for readers.

Readers Write

APPRECIATES SPECIAL PLACES

The "Special Places, Special Shores presentation in the August issue showed some of the gems saved by The Nature Conservancy. The article emphasized the need to protect areas that are difficult to place monetary values on. I question whether the smelt and balsam seeding shot are correctly labeled. The introductory photo and the shot of the seedling growing from the stump were excellent.

Edward C. Mueller
South Milwaukee, Wis.

Several gentle readers who enjoyed this article have correctly identified the small sapling growing out of a stump as Eastern hemlock, not balsam. We still believe the rock photo shows smelt. Small fish like smelt often take on unusual colors as they desiccate and the oils dry from their skin.

CORRECTION

The story "Special places, special shores" mistakenly identified public access to one of the mentioned properties.

The boat access to Jackson Harbor Ridges is from the Furrer Tract, which is east of the Gibson property. The Gibson Tract is privately-owned.

A FAN IN THE SERVICE

I really enjoy receiving Wisconsin Natural Resources magazine. Of all the states and 10 countries I've visited in the Navy, I like coming back to Wisconsin and I think you have the most to offer. The fishing tips piece in the April issue was great.

Also, thanks to Wisconsin for offering members of the Armed Forces hunting and fishing licenses at resident rates. I think it's great that the state cares about military people. You guys are tops with us.

Michael D. Wilcox, ET3
USS Forrestal
Miami, Fla.

TOO BIG A FISH TALE

I'm disappointed that the magazine published a shore lunch piece bragging about keeping fillets from six-pound smallmouth bass. I don't think that's the message you should be trying to get out and I question why any guide would keep such large fish to eat when smaller fish taste better, not to mention the conservation side of the issue.

Michael Kaiser
Wauwatosa, Wis.

We ran the piece to encourage people to enjoy another aspect of diverse fishing experiences. Rather than flail the waters all day, we believe the mood, relaxation, good company, good food and the chance to stretch one's legs make shore lunches a good idea. Your point about keeping larger fish is well taken. Smaller fish are, indeed, suitable for eating and, assuming that the fish are gingerly handled and healthy, we applaud those who return larger fish to the waters.

JIM MC EVOY

continued from page 2

quickly enough to escape predators.

The journey into the earth through moist ground or pond-bottom mud takes various forms. In Wisconsin, frogs and toads don't have shovel-like claws, but many do have cornified digging protrusions to make their way down through the soft earth. Some toads have been found buried three feet deep in the soil, and snapping turtles often burrow into muddy lake bottoms where they were active during the warmer months.

Amphibians and reptiles breathe through lungs and through special tissues in their skin (cutaneous respiration). Hibernation greatly slows their metabolism, so they survive for months without "holding their breath" while they sleep. They absorb enough air from pockets around their bodies or from their own cells. Muscle tissue especially holds a great deal of oxygen that can be used by the animal if needed.

Besides the danger of freezing, aquatic amphibians and reptiles must guard against moisture loss. Some amphibians construct a mucous cocoon. Snakes hibernate with other snakes, wrapping themselves into balls to decrease surface area and keep moist. Hundreds of snakes, sometimes several species at once, have been found together in one "hibernaculum" retreated from the savage cold.

When all else fails, some turtles survive being frozen alive. Hidden below the leaf litter, buried under a layer of mud, painted turtles can literally be super-cooled. When warmer temperatures arrive the creatures thaw with their surroundings, none the worse for wear. This cryogenic act has often surprised turtle-hunter and scientist alike, when their frozen "specimen" gets up and crosses the table.

Whether the distances are great or small, the physical challenges of migration are equally severe. The 1,000-mile trek by the roaming robin is no more miraculous than the five-foot burrow a mud turtle makes to find its safe winter haven. Anyway, by the time a turtle got to Florida, it would be time to start the trip back north again! ■

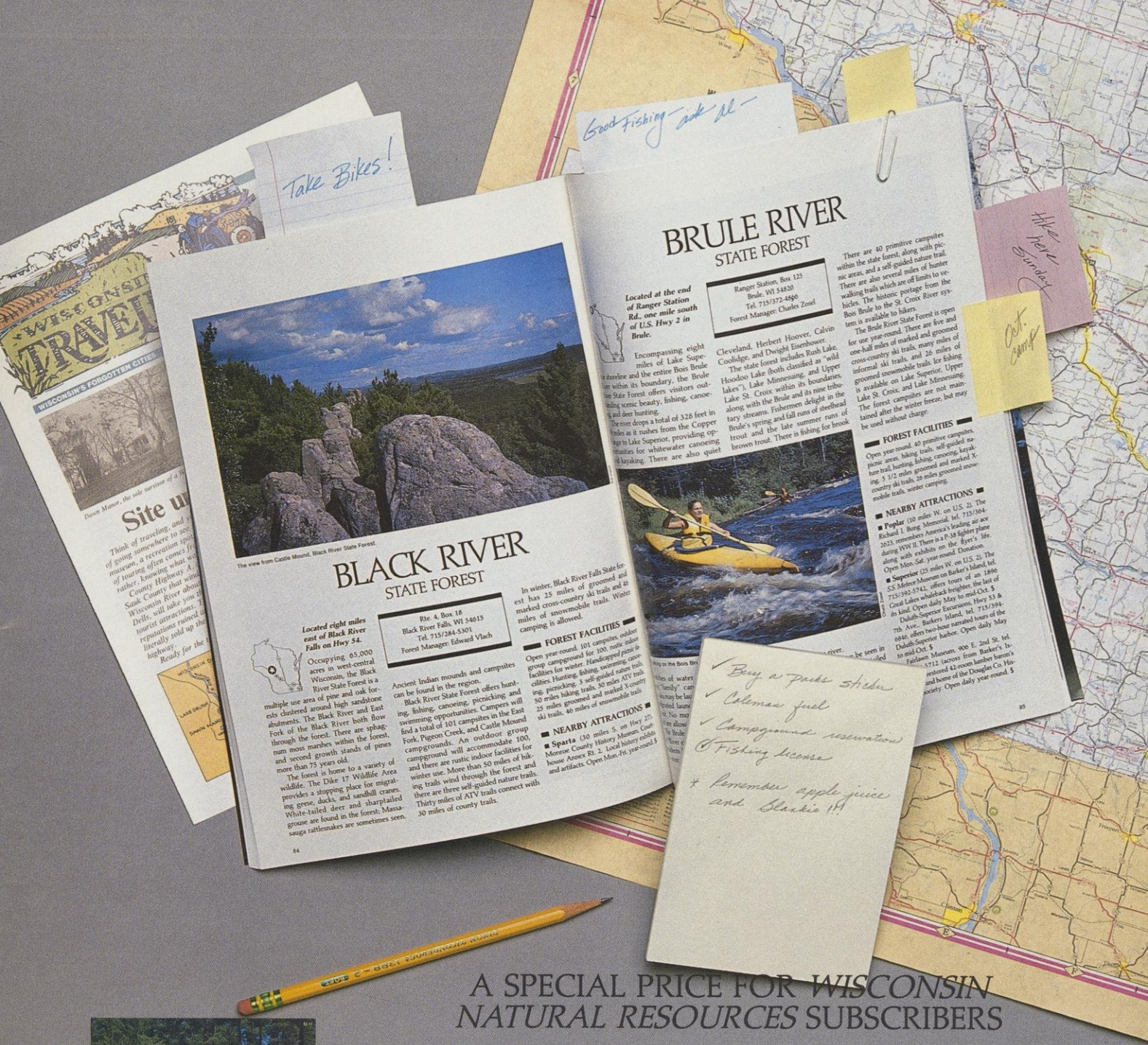
Carol Wooldrage studies environmental communications at the University of Wisconsin-Stevens Point. She served an internship with DNR's Bureau of Information and Education this summer.

Whitetail tales

Fathers and daughters, mothers and sons, grandparents and grandkids, tell us your stories. We would like to share the thrills of your deer hunt with other readers.

Send us a letter (up to two pages long) and a color photo (slides preferred) describing your hunt this fall. We are especially interested in impressions of first-time hunters (whether 16 or 60), stories of families who include deer hunting among their family traditions, fathers who introduce their daughters as well as their sons to deer hunting, mothers who hunt with their kids, youngsters who hunt with grandparents and hunters with unusual deer camp traditions.

Send your stories and photos by December 14th to: *Deer Tales, Wisconsin Natural Resources, Box 7921, Madison, WI 53707.* A compilation of the best stories and photos will appear in the February issue.



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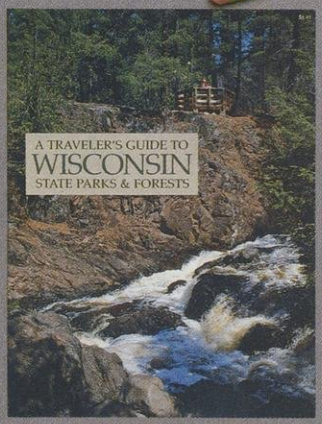

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