Winter 2009 Northern Woodlands Goes to School

Welcome to the Winter 2009 edition of *Northern Woodlands* magazine. In it, you'll find articles that probe the mysteries of winter in the Northern Forest. If trees are about 50% water, how do their living cells survive winter's deep freeze? How do "deer yards" help white-tailed deer survive the winter? How do trees recover from ice storm damage? You and your students will find answers to these questions, plus many other great articles, in this issue of *Northern Woodlands.*

This teacher's guide serves as a companion to *Northern Woodlands* magazine. In it are several indoor and outdoor activities that expand upon ideas presented in some of the magazine's articles. For each activity, we recommend related publications, contacts, and websites, as well as Project WILD and Project Learning Tree activities that build upon each activity theme. We also indicate the state curriculum standards each activity fulfills.

We'd like to extend special thanks to Maine TREE foundation, Alexander Host Foundation, and Ghostwriters Communications for their support of this project. As a result of their generosity, over 5,000 students throughout the Northeast are able to participate in Northern Woodlands Goes to School this year.

We would love to know your thoughts about our teacher's guide. If you have comments or suggestions, just call or email Dave Mance III at (802) 439-6292 (email: dave@northernwoodlands.org).

Noteworthy News

The State University of New York at Oswego offers an outstanding **Winter Science Curriculum Project,** which offers 49 lesson plans in biology, earth science, chemistry, and physics at the middle, high school, and advanced placement level. In general, each of the 49 activities includes student materials ready for duplication, a teacher's guide, and teacher background material. The materials were tested by classroom teachers and reviewed by experts for scientific accuracy. This project evolved to address the fact that many middle and high school teachers lack curriculum materials that take advantage of winter resources outside the classroom for the instruction of science concepts and skills, despite the fact that cold weather dominates the school year in most of the United States and Canada. Be sure to check out their site at www.oswego.edu/wscp.

If your students would like to take part in the **2010 Envirothon**, it's time to start preparing for this national competition. The Envirothon's mission is to develop knowledgeable, dedicated citizens willing to work towards achieving and maintaining balance between quality of life and quality of the environment. Team members in grades 9-12 collaborate to learn about the ecology and management of soils, forests, wildlife, and aquatics. They also practice dealing with complex resource management decisions as

they develop an oral presentation focused on a particular current environmental issue (the 2010 issue relates to protecting groundwater through urban, agricultural, and environmental planning). If your students get involved, they will compete, usually in May, with other teams from your state. The winner of each state's Envirothon competes in the national Envirothon, which will be held August 1-7, 2010, at California State University in Fresno, California. Visit www.envirothon.org for information about the 2010 competition. On that site, you'll find a list of local programs, which lists contact information for each state's Envirothon coordinator.

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1. Bird Nests in Winter

Which Bird Made That Nest?, by Bernd Heinrich (pg. 24)

Take your students on a winter woods walk to look for bird nests. Ask a member of your local Audubon Society chapter (or any other local birder) to accompany you and help select a site that will likely have nests. Though it would be nice to find someone who has familiarity with bird nests, it's not at all a necessity—this outing is about discovery and inquiry, not about knowing all the answers. Bring Heinrich's article with you to help with nest identification, as well as a camera and a bird nest field guide (see below). Bring binoculars for each student, if available, since they'll help students observe overhead nests. (The Audubon chapter may have binoculars to lend you). When you spot a nest, have students photograph it and identify its construction materials, size, and form. They can then use this information to identify the species that may have constructed each nest.

WILD	Who Fits Here? Which Niche? Adaptation Artistry
ME	English Language Arts A, D, E, H Science and Technology B, J
NH	English Language Arts 1, 2, 5, 6 Science 1a, 2a, 3a
NY	CDOS 3 Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies
VT	1.8 Reports 1.19 Research 6.2 Uses of Evidence and Data 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

The Cornell Lab of Ornithology manages the NestWatch program, which involves citizens in monitoring bird nests. While they are only interested in data on the active nesting season (spring and summer), their site can introduce students to the important ecological information that bird nests offer. You can also use this site in spring as a follow-up activity to the winter nest observations. Ask each of your students to select one of the locally occurring focal species listed on the NestWatch website (there are 24 listed, but some are only found in the western US.) Students can research its nest type, its habits and habitat, population trends, threats, and ways to address those threats. They can then create a multi-media presentation of their findings.

Books:

The Sibley Guide to Bird Life & Behavior, edited by Chris Elphick, John B. Dunning, Jr., and David Allen Sibley. Alfred A. Knopf: 2001

A Guide to the Nests, Eggs, and Nestlings of North American Birds, by Paul J. Baicich & J. O. Harrison. Princeton University Press: 2005.

Peterson Field Guide to Eastern Birds' Nests, by Hal H. Harrison. Houghton Mifflin Harcourt: 1998.

Website:

www.watch.birds.cornell.edu/nest/home/index. NestWatch is a citizen-science project and nest-monitoring database of the Cornell Lab of Ornithology.

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2. Wood Chemicals

The Wood Chemical Industry in the Northeast, by Dr. Hugh O. Canham (pg. 34)

Discoveries: Where the Cellulose Meets the Road, by Todd McLeish (pg. 52)

In his article, Dr. Canham describes the wood chemical industry around the turn of the 20th century. He notes, "As you can imagine, the region's wood resources were strained…. But that was a different age.

People were proud of their accomplishments and their industry, and clear-cut forests and air or water pollution were not yet concerns." Have students research the wood chemicals industry in your region, and learn about its social, economic, and ecological impacts. Your local and regional historical societies will be key resources in this research. Students should seek out photos, as well as written information.

Canham's article also discusses the potential for wood chemical production today, and McLeish's brief article offers an example of a new technology that utilizes wood fiber. Have students research and conduct a class debate about turning again to regional forests as a source of chemicals. They should familiarize themselves with ecological consequences in the forest (Can wood chemicals be harvested while maintaining forest health? What are the ecological impacts of harvesting "low-grade" hardwood? What ecological role does that wood play in the forest community?) and social consequences (potential for increased community self-sufficiency, "green" job opportunities, etc.). They should also contemplate alternatives to simply shifting from petroleum-based to wood-based products. Can we also reduce our demands for such chemicals?

Book: *The Wood Chemical Industry in the Delaware Valley*, by Dan Myers. Prior King Press: 1986. This book offers extensive history and photos of the northeastern wood chemicals industry.

Websites: www.smethporthistory.org/keystone/ and www.smethporthistory.org/crosby/wood.htm. These sites describe the history of the wood chemical industry in north-central Pennsylvania.

PLT	Trees for Many Reasons Mapping Your Community Through Time (*Places We Live* High School Module) What's a Forest to You? (*Focus on Forests* High School Module)
ME	Economics A English Language Arts A, B, D, H History B
NH	English Language Arts 1, 3, 4c, 5 Social Studies 17
NY	CDOS 3 managing Information ELA 3 Listening & Speaking MST 7 Strategies SS 1 SS 3 SS4
VT	1.13 Clarification and Restatement 1.19 Research 1.21 Selection 3.9 Sustainability 4.6 Understanding Place 6.3 Analyzing Knowledge 6.4 Historical Connections 6.8 Movements and Settlements 6.18 Nature of Conflict 7.16 Natural Resources and Agriculture

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3. Innovations for Wildlife

Safe Passage, by Carolyn Haley (pg. 19)

The sub-roadway tunnels described in Haley's article are one innovation that helps mitigate problems that human constructions create for wildlife. As human populations expand and natural habitats shrink, people and wildlife increasingly come into conflict over living space and food. How can humans and wildlife co-exist? Have your students identify sources of human-wildlife conflict. These may be, as in the article, a result of specific human constructions, like wind turbines, dams, power lines, fences, highways. Or they may be related to the more general trend of human encroachment on wildlife habitat, which results in increased conflicts—like black bears roaming suburban neighborhoods and, in other parts of the country, incidents with other large predators, like mountain lions, wolves, and grizzlies. Have each student select a human-wildlife conflict, research the conflict, and create a report that includes specific case studies of that conflict in action and innovative approaches to resolving the problem. Students can also document failed innovations, assess the current status of the problem, and project its status in the future.

Websites: www.humanwildlifeconflict.org. The non-profit Human-Wildlife Conflict Collaboration helps train

WILD	Shrinking Habitat Migration Barriers Deer Crossing Planning for People and Wildlife
ME	English Language Arts A, D, E, H Science and Technology B, J, M
NH	English Language Arts 1, 2, 5, 6, 7 Science 3a, 3b, 6a Social Studies 9, 14
NY	CDOS 3 Thinking Skills, Managing Information CDOS 5 Identify and Solve Problems MST 4 The Living Environment MST 7 Strategies
VT	1.8 Reports 1.19 Research 2.2 Problem Solving 3.9 Sustainability 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge 7.13 Organisms, Evolution, and Interdependence

individuals around the world in conflict resolution related to human-wildlife conflicts.

www.nationalwind.org/publications/wildlifewind.aspx. This site, maintained by the National Wind Coordinating Collaborative is an example of the kind of information available on mitigating problems created by human constructions like wind turbines.

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4. Winter Survival

Hardship in the Deeryard, by Susan C. Morse (pg. 32)
Species in the Spotlight: Scotch pine, Pinus sylvestris (pg. 23)

These two articles help students appreciate some of the challenges that non-human members of the Northern Forest community face in winter and the ways in which they adapt to this lean season. To expand upon the ideas in Morse's article, visit the SUNY Oswego website, http://www.oswego.edu/wscp/#units, and select the curriculum unit entitled, "Deer Browse Field Study." This high school-level unit will guide your students through the process of learning about the food requirements of deer in winter by assessing the availability of those foods in the field.

For middle school students, have each student choose a wildlife species of the Northern Forest to study. Students can research that animal's survival strategies and create an engaging interpretive display (including illustrations, maps, etc) from their findings.

WILD	Who Fits Here? Adaptation Artistry I'm Thirsty
ME	English Language Arts A, D, H Science and Technology B, J Visual and Performing Arts A
NH	English Language Arts 1, 5 Science 1a, 2a, 3a Visual Arts 1, 6
NY	ART 1 Visual Arts CDOS 3 Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies
VT	1.19 Research 5.28 Artistic Proficiency 6.3 Analyzing Knowledge 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

Books:

Winter World: The Ingenuity of Animal Survival, by Bernd Heinrich. Harper Perennial: 2009

Life in the Cold, by Peter J. Marchand. UPNE: 1996. (best for high school and AP level students)

Winter: An Ecological Handbook, by James C. Halfpenny. Johnson Books: 1989.

Website: www.oswego.edu/wscp/db.htm. Direct link to the SUNY Oswego deer browse curriculum unit.

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5. Discovering Winter Invertebrates

If Winter Comes, Can Springtails Be Far Behind?, by Alan Pistorius (pg. 16)

Take your students into the woods on a winter day to learn about invertebrate activity. Bring hand lenses and shallow containers for examining the topmost layer of soil (the organic layer). If it's a warm, sunny day, you may well see springtails peppering the snow beneath the trees. Have students dig down beneath the insulating snow. Scoop a handful of the leafy organic layer into a shallow container and use the hand lens to check for invertebrates. Have them sketch their findings on a data sheet or field journal.

ME	Science and Technology B,
NH	Science 1a, 2a, 2b, 3a, 6d
NY	MST 1 Scientific Inquiry MST 4 The Living Environment
VT	7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

For a more in-depth investigation, visit the SUNY Oswego website, http://www.oswego.edu/wscp/#units, and select the curriculum unit entitled, "Invertebrates Under the

Snow." In this middle- and high school-level unit, students learn about winter invertebrate activity by setting pitfall traps beneath the snow and examining the invertebrates they trap. They then relate invertebrate abundance data to the depth of snow, plant cover, and other physical conditions at each trap location.

Book: *Life in the Cold,* by Peter J. Marchand. UPNE: 1996. (best for high school and AP level students)

Websites: www.coopext.colostate.edu/4dmg/Pests/winter.htm. This website offers a straightforward introduction to winter survival strategies of insects.

www.si.edu/Encyclopedia_SI/nmnh/buginfo/winter.htm. The Smithsonian Institution also provides introductory information on various ways insects survive the winter.

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6. Tuning in to the Artist's Life

Outdoor Palette: Susan Abbott, by Adelaide Tyrol (pg. 71)

Susan Abbott's website is a treasure trove of artistic inspiration. Have your students explore her website and blogs, particularly her travel journals. Have them begin their own travel journal, recording in sketches and words their discoveries in and around their community and beyond. They don't need to travel great distances to keep a travel journal—the journal is simply an opportunity to notice the beauty and detail of the world around them.

ME	English Language Arts E Visual and Performing Arts A
NH	English Language Arts 2 Visual Arts 1, 6
NY	ART 1 Visual Arts ELA Speaking and Writing
VT	1.9 Narratives 5.28 Artistic Proficiency 5.29 Visual Arts

Book: *Keeping a Nature Journal,* by Claire Walker Leslie. Storey Publishing: 2003.

Website: Susan Abbott's website, www.susanabbott.com.

Wildlife Connection

Winter's Visitors, by Bryan Pfeiffer (pg. 45)

If your school does not yet have a winter bird-feeding station, it's not too late to set one up, preferably right outside your classroom window. Though it would be great to include a range of foods to attract a range of species, you'll be amazed how many species you get with a few black oil sunflower seed feeders. You may be able to get seed donations from your local farm supply or hardware store.

ME	Science and Technology B, J
NH	Science 1a, 2a, 2b, 3a, 6d
NY	MST 1 Scientific Inquiry MST 4 The Living Environment
VT	7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

Once you've established your bird feeding station, visit the SUNY Oswego website, http://www.oswego.edu/wscp/#units, and select the curriculum unit entitled, "Bird Natural History at Winter Feeder." This middle- to high school-level unit will guide your students through the process of making and recording observations of winter bird life at your school bird feeders.

Book: You'll want a few good birding field guides to identify birds. Every birder has their personal favorite, but the *Birds of North America* field guide in the *Golden Field Guide* series is a nice one to start with. St. Martin's Press: 2001.

Website: http://www.birdwatching.com/tips/birdfeedingwinter.html. Provides tips for attracting birds in winter.

Calendar Connection

Tapping Trees, by Carl Demrow (pg. 51)

This article can serve as a how-to for one of springtime's greatest pleasures and learning opportunities—tapping sugar maples and making maple syrup. Don't miss the chance to tap at least one sugar maple and boil the sap down into syrup. There are heaps of cross-disciplinary extensions to this tasty process—students can learn about the physiological process that results in sap flow, discover Native American practices for boiling sap, look at the changing technologies around maple sugaring and the economics of modern sugaring, and much more. Below you'll find a link to a high school-level unit on maple sugaring.

PLT	The Nature of Plants (*Forest Ecology* High School Module)
ME	Science and Technology B, J
NH	Science 1a, 2a, 2b, 3a, 6d
NY	MST 1 Scientific Inquiry MST 4 The Living Environment
VT	7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

Book: *Back Yard Sugarin': A Complete How-to Guide,* by Rink Mann. Countryman Press: 2006 (3rd ed.)

Website : www.stevesauter.com/Maple_Syrup_Lesson_Plan.html. High school lesson plan on maple sugaring.

Career Connection

At Work with Lynn Malerba Guiding in the Adirondacks, by Judith E. Harper (pg. 42)

In Harper's article, the reader learns how Lynn Malerba left a career as a physical education teacher to merge her love of teaching with her love of the outdoors. In his poem, *Two Tramps in Mud Time*, Robert Frost wrote, *"My object in living is to unite/ My avocation and my vocation/ As my two eyes make one in sight./ Only where love and need are one,/ And the work is play for mortal stakes,/ Is the deed ever really done/ For Heaven and the future's sakes."*

This article offers a lead-in for your students to reflect on their passions and to imagine the possibilities for vocations borne of those avocations. Have students read *Two Tramps in Mud Time* and ponder its meaning. Lynn Malerba created work that both unites her passions *and* pays the bills—she combined love and need, as Frost might say. Have students write an essay in which they consider how they might like to live their life, and whether they can imagine uniting avocation and vocation in their own lives. Encourage them to draw from specific moments, events, and images in their life to illustrate their ideas.

PLT	Words to Live By (*Focus on Forests* High School Module)
WILD	Wildwork
ME	Career Preparation A English Language Arts A, E
NH	Career learning 7 English Language Arts 1, 2
NY	ELA 1 Listening and Reading ELA 2 Speaking and Writing HPHE 3 Home Economics
VT	1.7 Responses to Literature 1.12 Personal Essays 3.15 Career Choices

Website: www.thisibelieve.org. *This I Believe* is based on a 1950s radio program of the same name, hosted by acclaimed journalist Edward R. Murrow. This I Believe, Inc., was founded in 2004 as a not-for-profit organization that engages youth and adults from all walks of life in writing, sharing, and discussing brief essays about the core values that guide their daily lives. On their website, you'll find many samples of essays, both written and recorded, that may inspire students as they prepare their own essays.

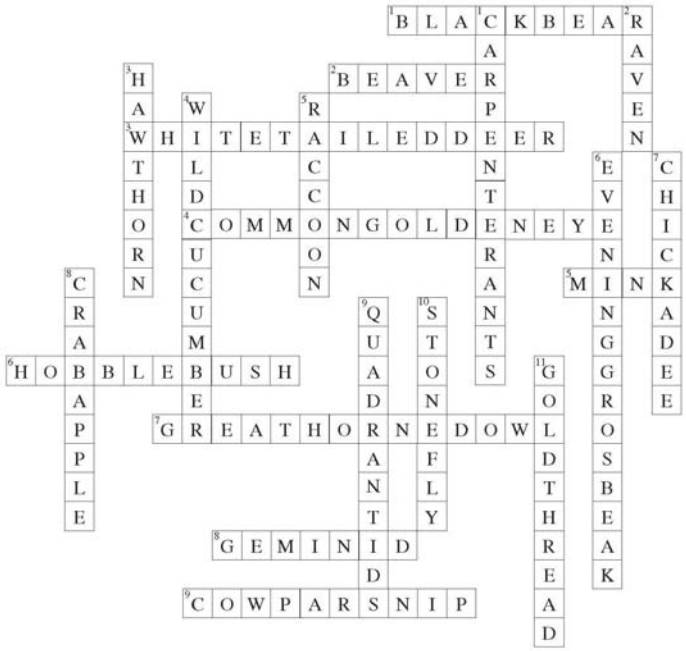
HANDOUTS
Writing from the Land
Ice Storm, by Andrea Hollander Budy (pg. 65)
Anatomy of an Ice-damaged Sugar Maple, by Patrick Bartlett (pg. 30)

In this *Northern Woodlands* issue, you'll find two very different writing forms (news article and poem) that cover the same topic—ice storms. Read these two pieces. Then choose one of the other news articles in the magazine, read it, and write a poem on the subject.

Crossword Puzzle

Use the *Winter Calendar* (pg. 4) to help you answer the following clues:

ACROSS	**DOWN**
1. This mammal's body temperature drops 8° during winter hibernation (two words) BLACK BEAR	1. In winter, these invertebrates cluster together, motionless, in big logs or trees (two words). CARPENTER ANTS
2. This mammal stores fat in its tail. BEAVER	2. The acrobatic courtship display of this bird begins in February. RAVEN
3. This mammal can eat six to eight pounds of twigs a day in winter (three words). WHITE-TAILED DEER	3. The fruits of this tree supply emergency food to many wildlife species in late winter. HAWTHORN
4. As rivers begin to thaw in late winter, this waterfowl species returns to open stretches of water (two words). COMMON GOLDENEYE	4. The prickly pods of this climbing vine become paper thin in winter (two words). WILD CUCUMBER
5. This mammal makes its den near water, sometimes in an old muskrat or beaver den. MINK	5. This mammal will sometimes use a woodchuck hole for temporary shelter. RACCOON
6. Like all species of viburnum, this species has naked buds, meaning that its miniature leaves lack bud scales. HOBBLEBUSH	6. This bird's strong bill can open cherry pits (two words). EVENING GROSBEAK
7. This bird species is the earliest nester in the Northern Forest, beginning its nesting season in February (three words). GREAT HORNED OWL	7. As early as January, you can hear the breeding song of this year-round resident bird. CHICKADEE
8. Multi-colored meteor shower in December. GEMINID	8. Favorite winter food of the cedar waxwing. CRABAPPLE
9. Many insects live in the hollow stalks of this plant, which can grow to be 10 feet tall (two words). COW PARSNIP	9. In January, you may see as many as 40 meteors per hour during this meteor shower. QUADRANTIDS
	10. In February, you may find this insect perched on a rock by a clean-flowing river (two words). STONE FLY
	11. The three-lobed leaves of this plant stay green all winter. GOLDTHREAD



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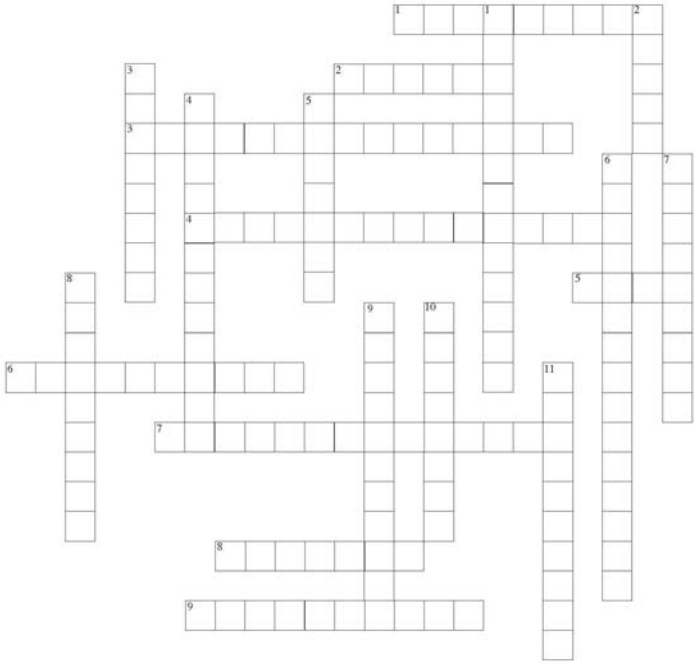

Word Search
Using the *Winter Calendar* (pg. 4) to help you answer the following clues, find ten animals of the Northern Forest in the word search puzzle below.

1. You may see this hardy duck on open water in rivers, lakes, and ponds in December (two words). COMMON MERGANSER
2. This mammal's body temperature drops to around 40° in mid-winter. WOODCHUCK
3. Marsupial mammal found in New England (two words). VIRGINIA OPOSSUM
4. This mammal chews on sugar maple twigs in late winter to feed on the tree's sweet sap (two words). RED SQUIRREL
5. Look for this bird of prey diving for fish in open water below dams (two words). BALD EAGLE
6. This mammal eats lichens in winter (two words) FLYING SQUIRREL
7. In winter, this small bird forages for insects and spiders, mostly in softwood trees (three words). GOLDEN-CROWNED KINGLET
8. Important food for hawks and owls in late winter (two words). MEADOW VOLE
9. When snow levels exceed six inches, this mammal must bound to get through the snow, a process that requires much more energy than walking (two words). RED FOX
10. During winter thaws, you may see this hive-dwelling insect flying about. HONEYBEE

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