

Pigeon River Country Association Newsletter

Spring 2016



Hydrocarbons: A glimpse at the forest floor

When we don't see much activity in the forest except for swaying branches, it suggests we might want to look again.

Entomologist Edward O. Wilson goes no more than a few hundred feet into a forest before taking in the world beneath some log: soil scent, a wolf spider carrying a white silken egg, millipedes coiling in defense, ... what he calls the giants. At one-tenth that size are thousands of animals he looks at on a white ground cloth. In microscopic films of water are 10 billion bacteria in every thimbleful of soil and plant matter.

Pigeon River Country, page 298

Actually, we don't have to look under a log.



A rocking arrow points down to a gathering of microorganisms just off Lost Cabin Trail. We can't see them with the naked eye—that's why they're called microorganisms. Besides that, they are a long way down, about a mile. And they have been dead about 400 million years. Still, we have heard about them quite a lot. We call them oil.

Some people, quite a few, really, have been looking at this oil under the Pigeon River Country for nearly half a century now. They've stored pieces of this earth in a repository at Marquette, a whole collection from 67 Michigan counties. It's called the Geological Core and Sample Repository, maintained by the Geological Survey Division of the Michigan Department of Environmental Quality and available

for study, along with well logs and thousands of surface and underground maps.

It's the kind of thing to pique the interest of young persons who maybe can't help sifting through a pile of stones or staring at the colors and patterns of exposed earth.



Say, for example, this colorful rock sitting quietly near Blue Lakes. It hasn't been there forever. All its various parts gathered long, long ago in a liquid matrix, probably in what we now call Canada, solidified, and crept inch by inch into Pigeon River Country encased in a glacier. The last one of those melted away 10,000 years ago, a mere blink of time when talking about hydrocarbons.

If we treat the 4.5 billion years of earth history as one calendar year, that Valders glacier melted away on Dec. 31 at one minute before midnight. In the vast time before that, what we usually think of as ancient history was hardly a day or two ago. Dinosaurs disappeared (except for the bird variety) the day after Christmas and our species emerged along with other mammals in those last few days of the year. Almost all of what science knows about geology starts with the Cambrian—well after Halloween. All the many months before that sit like a huge, dark pit where our puny flashlight has spotted a handful of clues.

Those interested in who our parents were might just be fascinated peering back into that vast time, for the earth is every bit a parent as are the minerals formed in stars. Those who find interest in how nations formed, evolved, changed shape, might be intrigued studying how the very substances beneath their feet changed boundaries, for that

story is many times richer in the living color of upheaval, folding, eruption, fire, heat, and cold, to say nothing of intense pressures over unimaginable periods of time.

Andrea Sullivan grew up downstate with seven brothers and two sisters. “My big plan was to be an oceanographer. You couldn’t keep me out of the water when I was a kid. I took a bunch of basic science classes and I loved earth science. And that was it.”

“I told my advisor, Michigan has a lot of water. Groundwater’s going to become really important. And here I am.” She’s retiring soon as a senior geologist in the Michigan Department of Environmental Quality. Pigeon River Country has been within her area of responsibility since 1985.

Andrea sat the other day in the Gaylord office with Andy Stempke, supervisor of the Cadillac district, which encompasses the northern 22 counties of the Lower Peninsula. We talked not only about oil and gas wells in the Pigeon, but also about what might be under our boots when we’re out there.

We can sketch what’s known by following a drill bit descending through the crust of earth off Lost Cabin Trail known as Charlton Township section 4 in May 1970 (page 83 in our *Pigeon River Country* revised edition, or page 96 in the first edition). The glimpse begins with:

Down went the swirling bit through gravel, sand, and clay, through layers of sandstone, shales, limestones, dolomites, anhydrites, cherts, and salt ... It cut through the Wisconsin drift from the Pleistocene period, disturbing rock that had been in place for upward of one million years during the four glacial ages.

It concludes with what happened when:

...the drill bit entered the 400-million-year-old Niagaran reef 4,671 feet below the drill pad next to the Black River Swamp ...

The coral reef that became the Niagara Escarpment under what’s now the Pigeon and beyond was formed by microorganisms during the Silurian period in water along the shoreline of an inland sea, “thick, thick stuff,” Andrea said. The organisms became rocks, as Andy put it, long after they were buried beneath the earth accumulating over the dry seabed. Author John McPhee says in one of his books on geology, *In Suspect Terrain*:

“Petroleum—the transmuted fossils of ocean algae—forms when the rock that holds the fossils becomes heated to the temperature of a cup of coffee and remains as warm or warmer for at least a million years. The minimum tem-

perature is about fifty degrees Celsius. At lower temperatures, the algal remains will not turn into oil. At temperatures hotter than a hundred and fifty degrees, any oil or potential oil within the rock is destroyed.”

So from that point on, the Niagaran seabed beneath the Pigeon, stretching to Niagara Falls, remained relatively stable at what is now nearly a mile down. Hydrocarbons stayed within the temperature window and did not get pushed to the surface, where they would have turned into something else.

There are three other locations below ground that have attracted hydrocarbon industry interest, two much farther down and one much nearer the surface:

-Some 50 million years lower than the Niagaran, formations known as Utica and Collingwood have begun to yield oil and gas from hydraulic fracturing—fracking—by pumping high-pressure water into them, but not in Pigeon River Country, at least not yet.

-Another 50 million years deeper than Utica-Collingwood, a formation we call Prairie du Chien from half a billion years ago started yielding natural gas in the northern Lower Peninsula in the 1980s but proved too difficult to extract, compared with deposits close to the surface.

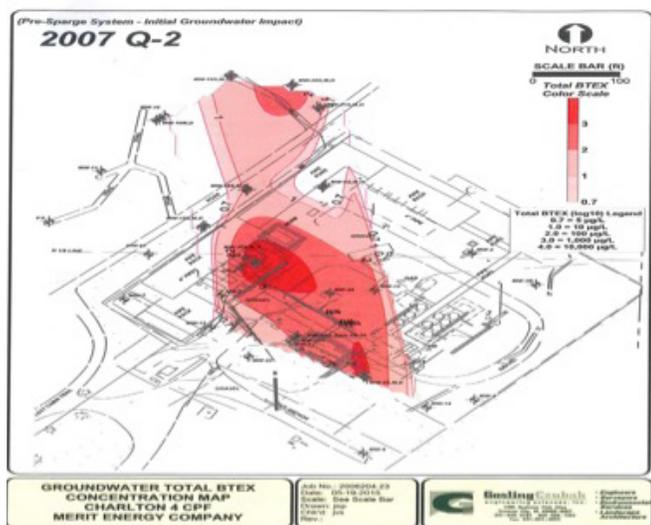
-Above the Niagaran, Antrim shale in formations about 350 million years old offered much easier access. The Antrim layer has provided record quantities of natural gas. Our book noted that “hydrocarbon development pressure at the forest edges ... reintensified” with the gas activity in the 1980s and 90s.

McPhee quotes a geologist that natural gas forms at much wider temperatures than does oil. “You get natural gas as soon as anything drops dead,” the geologist said. “For oil, the requisites are the organic material and the thermal window.”

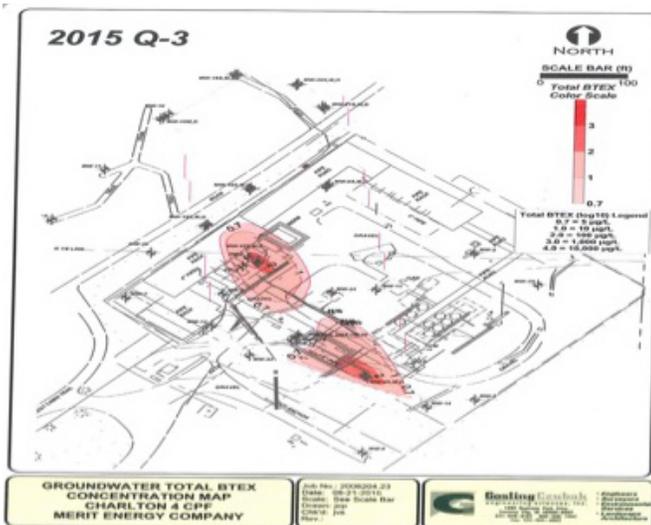
It would be misleading, however, to picture these formations as sitting undisturbed in one place until penetrated by the 20th Century hydrocarbon industry. Some hundred million years after the Niagaran reef formed, the whole North American continent had drifted up against all the other continents on one side of the earth. We call it Pangaea, from the Greek word for “universal world.” Pangaea lasted only another hundred million years, and by 200 million years ago was on its way to becoming the separate continents we know today as Africa, Asia, Australia, and so on. So the earth a mile below Pigeon River Country has conducted its own ponderous but relentless travel around the globe.

Even the oldest formations we're talking about are infants compared with the gases and other materials that have come and gone through earth's history. In its first years, 4.5 billion to 3.9 billion years ago, the planet was molten lava. Water was so hot it floated as a vapor in an atmosphere of cyanide and formaldehyde. Yet in the next period, the Archean Eon that lasted 1.3 billion years, life blossomed in colonies of microbes even as the earth was still cooling and before there was breathable oxygen.

What are conditions in the forest today? There are 17 Niagaran wells and 5 Antrim gas-only wells active. The Niagaran wells produce both oil and gas, in varying amounts. One Niagaran site had a slow leak during the Shell ownership days that is still being cleaned up: Charlton 4 near the Black River Swamp off Lost Cabin Trail.



Contamination discovered at Charlton 4 in 2007.



What remained of the Charlton 4 contamination by 2015.

Merit inherited eight contaminated production sites statewide, including the Charlton 4 central production facility in the Pigeon River Country, where it found BTEX in the groundwater seven to 14 feet below the surface.

Pigeon River Country, p 107

Merit dug down 15-20 feet deep, excavated, and hauled away 10,000 yards of soil.

Andrea and Andy said there have been no other major contaminations found in the forest. As in other industries, accidents sometimes occur, Andy said, but the spills have been contained and cleaned up in a day or two. On Jan. 31, 2016, an estimated eight barrels of oil spilled at Forest 24 during routine maintenance. Andy Stempke told the PRC Advisory Council on April 15 that oil degrades into BTEX only if it remains unattended for long periods. The Forest 24 spill, nowhere near a stream, was removed from atop the frozen ground within a few days.

Pipelines are monitored continuously, and steel pipes are pressurized once a year to test for leaks (polyethylene pipes every three years). Antrim gas activity has fewer potential problems than oil. The most difficult gas incident in the Pigeon occurred during the Antrim startup days nearly two decades ago.

In October 1999, the Sturgeon ran cloudy when Mercury Exploration ran a 1,000-foot directional [Antrim gas] bore some 15 feet or more under the riverbed. Clay and water slurry being pumped into the bore under pressure forced its way out of a fracture and rose to the surface eight or ten feet from the bank and drifted into the river.

Pigeon River Country, p 109

There has been no such incident since, Andy said. Many Antrim gas wells are being shut down and the challenge now is to make sure the smaller companies are accountable for properly closing the wells and restoring the sites. The larger companies have performed very satisfactorily, Andrea said. A plan to drill many Antrim wells at Song of the Morning Ranch ended with no wells in production.

Early in the Antrim gas activity, Andrea Sullivan initiated a policy asking the companies to present their entire plan for a property at once, giving the DEQ the opportunity to find the best location for wells that took the environment and aesthetics into consideration. She said it worked well for all concerned.

“The Pigeon River standard,” Andrea said, “for a long time, that was what everybody aspired to.” As new drilling in the Pigeon concluded, standards continued to be improved elsewhere in Michigan. The last Pigeon oil well drilling was by Shell around 1984, a dry hole. Since then, “we’ve tried

to keep our rules up to date,” Andy said, “addressing problems as they arise. We like to think our rules in Michigan are pretty stringent ... some of the toughest in the country.”

“And we hear that from companies that drill all over the world,” Andrea said.

Walking on a well site or most other forest places when it's not snow season leaves a little grit on the bottom of your shoes from sand. The grains are rather independent, even when clustered temporarily by moisture. While the mud from clay acts something like molasses, this surface material—glacial till—is more like piles of tiny marbles, pocked and rough to be sure, but more easily shifted into a variety of patterns.

At Corwith 1–10, investigators found a layer of silt 12 to 30 feet thick that lay like a crumpled tarpaulin some 20 or 30 feet below the drill pad. Water rolled across the silt layer in all directions ... Pigeon River Country, p 106

Michigan geologic “formations are pretty homogeneous over large areas,” Andrea noted, so the Niagaran and Ant-rim layers under the Pigeon are similar to those a hundred miles away under Manistee. “But as you get closer to the surface things change drastically from one place to the next.” Monitoring wells have found “clay lenses at so many different depths that groundwater was flowing in three directions.” The natural movement of water beneath the surface continues to fascinate her.



Pipeline presents minimal image in Pigeon River Country.

Meanwhile, they are estimating about three more years for the Charlton 4 cleanup to be completed. And the pipeline corridors continue blending in with new forest greenery.



A native columbine decorates a pipeline corridor in the Pigeon.

No cabin rentals—for now

The Pigeon River Country Advisory Council was told April 15 that the proposal considering a rental program for cabins recently acquired in land purchases will not go forward.

Fees collected would not cover the costs, Kelly Kinser of the Parks and Recreation Division, said. She added it was up to Scott Whitcomb's forestry division what to do with the two cabins from the purchases that set the proposal in motion in 2014. In a divided vote, the advisory council recommended last spring that the Department of Natural Resources director not carry out such a proposal because it was not consistent with Concept of Management directives. Our website, www.pigeonriver.org, has reports in the newsletter archives.

Scott Whitcomb said he was evaluating how to proceed and has begun preliminary steps for removal of the cabin off Sawdust Pile Road and one on another property more recently acquired.

Discovering

In boxes of files brought to the Pigeon River Country Discovery Center is a folder of papers labeled PRC Association history. In it is the carbon of a letter from Ned Caveney,

the resident forest manager, to Jerry Myers, thanking Jerry for suggesting that some kind of interpretive center be established to highlight the accomplishments of P.S. Lovejoy.

It's dated March 1984.

The log house that Ned lived in at the time is a beehive of activity preparing it to open later in this year of 2016 as the discovery center acknowledging not only Lovejoy, but others who have contributed to managing Pigeon River Country as a special place. A work force of eighty to one hundred volunteers is expected on May 20 to powerwash and otherwise help get the log building and its surroundings ready. Huron Pines is providing the bulk of the helpers, from AmeriCorps.

Joe Jarecki moved into the residence in 1990, succeeding Ned and becoming the last occupant in the structure that has sat vacant for a decade. It's first occupant, forester William Horsell, moved into the new structure in 1936. His son, Bill, was born there and Bill's son, Bill, is now construction manager in preparing the discovery center, and Bill's son (the first forester's great-grandson), is also working there. A 1982 interview with some Horsells comprises the chapter "Living at Headquarters" in our book:

The Horsells were in Pigeon River Country on February 9, 1934 when the thermometer reached 51 below, the coldest day on record in Michigan.

Bill: The kerosene froze in the cans.
Pigeon River Country, p 179

A wooden ramp for handicap accessibility has just been built over a portion of the flagstone porch. Scrub has been cleared around the building, leaving what Sandy Franz of the PRC Advisory Council calls "a spectacular view" of the Pigeon River that is to be incorporated into one of the indoor exhibits.

People wishing to volunteer for the May 20 work project are asked to sign up at <https://www.surveymonkey.com/r/northernmiamericorps> Among the tasks to be carried out: painting, washing, cleaning out interior; washing windows; powerwashing building; creating gravel trail from headquarters to center; native plantings along trail.

As we continue to prepare for discovery center displays and activities, we are looking for ways to involve young people. Following are some reports from the field that might appeal to a curious youth.

Earthy Spring

Spring in the forest offers itself in as many layers as a curious person may want, from a horizon of budding branches turning red to molecules rising in the air with the smell of earth, from late snow slumping off pines to male chickadees singing their two-note Fee-bee song.

Researchers say the earthy smell of soil in the spring is called petrichor. Some say it comes from raindrops releasing molecules of soil when they hit at just the right speed in just the right place. Others point out little creatures, microbes called *Streptomyces*, put out a chemical that smells like earth.

For the curious, scientists of the raindrop scenario note that it works on sandy clay but not on sand alone. Someone might want to stand in some of the many sandy and sandy clay spots in the Pigeon to check it out.

The really curious might bring a microscope and study some microbes waking up from a frigid winter.

Others might compare the various shades of red in the distant landscape, or examine the buds up close, or listen for the more than 200 species of birds, or sit motionless until a few mammals wander by, say a family of fox pups in their own shade of red.

Or even experience a walk in the woods while not thinking about much of anything.

That's not to say we can't do some truly deep thinking in a place like the Pigeon. I might sit in a dark peaceful night looking skyward to ponder this idea from quantum mechanics: The vacuum state is not truly empty but instead contains fleeting electromagnetic waves and particles.

Or this one: Dark energy accounts for 73% of the total mass-energy of cosmology. It's hypothetical, but is needed to reconcile the measured geometry of space with the total amount of matter in the universe. Yet we don't see it, and it doesn't interact with any fundamental force except gravity.

Or deeper yet: I am a momentary fluctuation in a field of matter and energy out in space. My memories and the world I think I see are illusions. This is what some of the basic theories and recent discoveries of cosmology imply when carried to their logical conclusion. Cosmologists, it should be said, don't believe it and many are trying to apply their best efforts at figuring out the real situation. Any of us could think about it, if we so desire, maybe while next to our tent at night in the forest.

While I'm sitting there, life continues to emerge all around me. Mainly, some scientists say, life emerges by the creation of new parts of the universe. What that might mean could just as easily be pondered in the forest as in a think tank or lab. Sitting in the deep darkness of the woods can make me question all sorts of things that daylight dispels.

Yet daylight has its wonders to ponder as well. Researchers find evidence of plants being able to distinguish between those who are their relatives and those who are not. In some studies, family plants get to share nutrients, while strangers fight root and twig to keep nutrients to themselves. They seem to know who's who by sensing wavelengths of light and chemicals moving hither and yon. There are still plenty of people ready to tell me plants don't think, but some now are not so sure about that, me among them.

We are, on this planet, one great life force. And what makes this life force possible is simply the fundamental ways in which our universe works. It's rather fun to get out in the forest and watch the movie in full dimension.

Forest Dignity

Everything on the natural land has its dignity: the collection of brown leaves left flattened and dark by winter, each sparkle of sunlight rippling across the river surface, the column of ants approaching a tree trunk, the troop of grasses standing tall in formation along the shallows of the lake.

We may miss much of it when operating at our normal speed and efficiency. Salamanders, for example, were courting while we were distracted by fall colors. Now, a female Mudpuppy is finding or digging a nest cavity beneath a log or rock, with the opening facing downstream, and will hang maybe a hundred eggs from the roof, each one attached by a string of gelatin. These baby Mudpuppies will hatch in a month or two and mature in about four years to the size of their parents—about the length of a ruler.

Those who follow such things have given salamanders approachable names—Mudpuppy and Newt, for example, in northern Michigan. The Red-backed Salamander is trimmer than any of six species of the Mole Salamander genus in the Great Lakes region.

One can get caught up in bookish things like names and classifications. It might be more meaningful in the life of a Homo sapiens to see a Red-backed Salamander hiding in plain sight when discovered under a leaf, or fleeing into leaf litter by doing what looks to us like swimming and

running at the same time. A mammal, bird, or snake might be left holding a fiercely-wriggling tail while the rest of the salamander escapes to grow a new tail.

Crickets would rather we not see them at all: they hide their flat little bodies and much longer antennae under things all day. But their songs reach out and touch someone—everyone—who is within range at night. Mole crickets hang out near streams and marshes, rubbing a scraper on one wing with a file on the other, keeping the wings elevated to create a chamber that amplifies the one, two, or three low chirps each second that fill the night air.

Eastern Chipmunks also make plenty of noise and don't seem to mind if we see them or not. They "chip-chip" away with a trill in broad daylight, both males and females, seeming to keep the beat with their tail. They also send a lower "chuck-chuck-chuck" echoing off through the woods. Such songs are solos. Chipmunks mate in March or April but otherwise have their own little territories.

Strolling down a remote path in a 170-square-mile forest offers a rare opportunity for a person to get what acoustic ecologists call an *ear cleaning*. It means listening closely while being quiet oneself. Some acoustic engineers have taken to calling such a stroll a *soundwalk*. "All one has to do is stroll for a couple of hours without saying a word, focusing intently on the sounds," Trevor Cox says in *The Sound Book: The Science of the Sonic Wonders of The World* (2014).

Soundwalking, Cox says, "can help anyone learn to consciously tune in to previously overlooked delights. We have at our disposal immense cognitive power to analyze sound—after all, listening to and decoding music and speech is an incredibly complex task."



Cox describes moths in rainforests that have evolved *swallowtails* six times the length of the moth as a decoy. More times than not, bats attack the decoy and the moth

flies free, like a wriggling salamander, losing its tail but not its life. In our northern forests, however, swallowtail refers to a butterfly family with a tail extending a short way from the rear of its wings. The Canadian Tiger Swallowtail, likely what we see alighting at the Pigeon Bridge Campground on a spring afternoon, looks like it has horns until you realize those are the swallowtails and the head is at the other end, possibly retrieving sodium or other minerals from animal urine on the ground. The butterfly is a colorful clue to where mammals have paused in passing by.

Ownership of Forests

Sir Leicester Dedlock ... would on the whole admit Nature to be a good idea (a little low, perhaps, when not enclosed with a park-fence), but an idea dependent for its execution on your great county families.

--- Charles Dickens (1853)

How uncomfortable such an aristocrat, fictional or otherwise, would be to watch the United States establish four decades later the National Forest System (1891) to help conserve forests and watersheds, or establish two decades after that a National Park System (1916) to administer some 20 million acres of land on behalf of all citizens.

Yet how encouraged this baronet might be that in the 21st Century officials elected to America's state and local governments openly advocated removing our forests from the hands of all its citizens and returning them to private ownership.

The current crop of privateers march under a supposed banner of saving our money by reducing taxes. But they march to the same drum beat as aristocrats claiming the general public cannot do for itself what a handful of the wealthy should be given the freedom to make the most of themselves.

Michigan established its first state "forest" in 1903, but land in public ownership was mostly treated as a resource to be exploited for its commercial value—an idea that lives on today with renewed vigor. It's no wonder that those who have valued natural land for its own sake have so revered people like P.S. Lovejoy for wanting to set aside a place like the Pigeon River Country. Lovejoy, Herman Lunden, and others stand tall when compared with the short-sighted advocates of denying us land that we hold together on behalf of the overall health of the land itself and all living things that benefit from it.

A problem bigger than a budworm infestation

A Pigeon River Country Advisory Council discussion about clearcutting led to the broader issue of diseases threatening the forest health and how it should be managed.

"What we see is a catastrophe going on around us in forestry," Pete Gustafson said, referring not only to spruce budworm, but oak wilt, beechbark disease, and others. "The ash are gone. Cedar's browsed and difficult to regenerate. We've got elm depleted," and potential problems for maple.

The Concept of Management was written without considering these newly prevalent diseases, he said. It "deals with healthy forest systems."

"I'd like us to take this up as a topic and become better informed as members and think about how this new paradigm affects the concept."

Chairman John Walters slated it for subsequent discussion. "The other component of this is climate change," Sandy Franz noted.

The immediate question at this April 15 meeting was whether to support a request to clearcut three stands of white spruce and balsam fir that are in excess of the 40-acre maximum called for in the concept. They are a 44-, a 45-, and a 70-acre parcel that would be cut before the budworm arrives. The infestation has not reached the forest but is already attacking such stands in the northern Lower Peninsula. The council voted 8-4 to recommend granting a variance for the clearcuts.

Moving mountains

Following is from what Rudi Edel sent to the rest of the steering committee on April 18. It shows what goes on day after day among those of good will in preparing the Pigeon River Country Discovery Center.

Sandy Franz and I measured all rooms so I could calculate paint and cleaning supplies. Those calculations were added to the list of needed equipment sent to me by Dylan [Goodell of AmeriCorps, a planner for the May 20 work project].

I simply stopped at Home Depot to drop off the list and ask for some donations/help. By the time I was done talking with the manager, he wanted to provide all the materials and he also wanted to try and totally pay for it through a

grant. But the filing date ended last week for May project grants.

His plan was to submit a grant by 5 p.m. and then call Corporate and use his influence to get it added to the pile for May projects. If he were unsuccessful then he would sell us the materials at a reduced cost so we can make our May 20th deadline. He also wants to make this a special project for the Home Depot store in Gaylord by sending employees out to us that day as volunteers.

The store manager spent the next 90 minutes with me as he double-checked some of the requested materials and quantities and we walked around the store recording SKU numbers from various products. We then went to his office where he developed a proposal quote. He then assigned an employee to work with me for 15 minutes, doing MY paperwork for Home Depot tax-exempt status at Corporate (We are supposed to prepare and file this paperwork but time was critical). By noon he asked me to go home, gather my files and come back at 1:30 p.m. At 1:30 he assigned his "Home Depot Team Captain" employee to work with me all afternoon in her office and the two of us co-authored a written grant application to be filed by 5 p.m. We made it by minutes!

So, a grant was submitted to Home Depot Corporate for \$1,995. If granted, the money will cover the following:

- 30 gallons of KILZ MAX with odor control for maximum covering and odor control
- 12 brushes and paint pans
- 12 rollers, handles, pans
- 3 roller extensions
- Enough tape to mask off all rooms
- Enough drop cloth material to wrap the entire building
- 6 digging shovels
- 2 loppers for brushing the trail
- Various size gloves for painting and digging
- Buckets and Murphy Oil Soap
- Rags, towels, paper towels
- Windex cleaning solvent
- A few more things but my file is back in the basement and I am getting tired to go down and look again.

In addition he will provide a wheelbarrow and 6 additional shovels 'on-loan' for the day, which then brings us to what Dylan said we needed.

When we were done at 5 p.m. he said he would call Corporate hoping to get this grant application added to the May projects. "Let's see if we can move mountains" was his closing comment.

[Among many other gestures of support have been a \$1,000 grant from Walmart for exhibit design and fabrication, and a \$7,000 grant from Great Lakes Energy to double electrical service to the building, upgrade electrical panels, install on-demand water heaters, and change all lights and plug receptacles.]

Membership renewal reminder

Your membership dues help make it possible to provide a scholarship to a student intern who assists the PRCSF unit manager in the summer with many projects that would otherwise not be completed due to limited staffing. Your dues also help us participate in important activities such as the Song of the Morning dam removal project and the discovery center project at the former PRC unit manager residence.

Your membership expiration date is on the mailing label of your newsletter or in the email message sending this newsletter. Please keep your membership current.

Thank you.

This newsletter can be seen with photographs in color on our website, www.pigeonriver.org.