



PINELANDS
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Harrisville Pond in Wharton State Forest

Groundwater - An Environmental Issue

by Richard Bizub, Director for Water Programs

This issue of *Inside the Pinelands* focuses on how groundwater withdrawals from the shallow Kirkwood-Cohansey aquifer are altering the unique ecosystem of the area. This shallow aquifer provides more than 90% of water found in all rivers, streams and wetlands of the Pinelands. It is the lifeblood of the Pinelands.

The following three examples — and unfortunately there are more — represent a growing problem facing the Pinelands and the state as a whole: excessive pumping of aquifers impacts both the ecosystem and the long-term sustainable use of water supplies for people. Evidence that this problem is growing comes not just from anecdotal experience or a few unusually egregious cases, but from a body of rigorous scientific studies by the U.S. Geological Survey (USGS), the Pinelands Commission and others.

On a cold and snowy morning in 2003 over

350 people, mostly seniors, packed a fire house to voice their concerns at a public hearing. The hearing was held at the request of the Pinelands Preservation Alliance by the New Jersey Department of Environmental Protection (NJDEP) to address a proposed state action that would have a direct impact on the region's quality of life and ecosystem.

The hearing was to determine whether or not, the local water company should be allowed to remove an additional 95 million gallons of water per year from the shallow aquifer beneath the town. Based on testimony from the hearing, the NJDEP recognized that there was a serious concern for the environment. Ultimately, NJDEP came to an agreement to allow the water company to drill a well in a deeper aquifer to avoid any direct impacts to the wetlands.

In a similar situation in Camden County, a municipal supply well went on-line

continued on page 5

Art Exhibit

Centralia & Beyond: Yesterday in the Pines

by

Michael Neuhaus

*PPA Headquarters
17 Pemberton Road
Southampton, NJ*

This photography exhibit
will be on display thru
December.

Hours: Mon. - Fri.
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In order to appreciate the important role that the shallow Kirkwood-Cohansey aquifer plays with regards to streams, wetlands and ponds in the Pinelands, it's necessary to understand a little about groundwater hydrology.

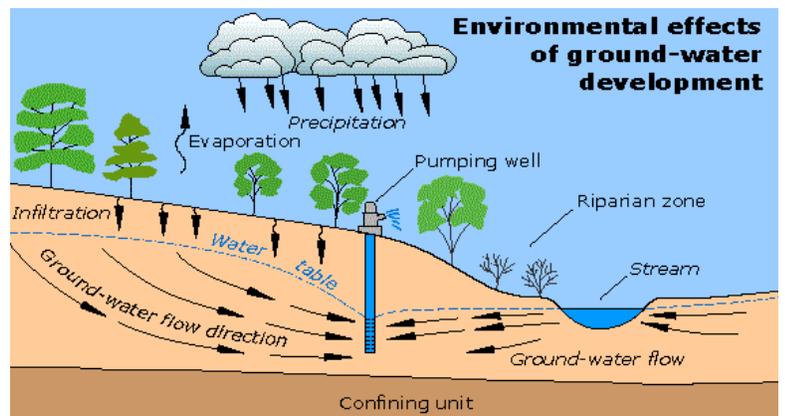
In general, the Pinelands receives about 44 inches of precipitation per year. Of this, approximately 24 inches is lost back into the air by evaporation and transpiration from vegetation. An additional 2 to 3 inches actually runs off the land surface to the nearest water body. The reason for the low amount of runoff is because Pinelands soils are porous and accept water more readily. Of the 44 inches of total annual precipitation, about 17 to 19 inches actually works its way into the shallow aquifer.

On a regional or watershed basis, water that reaches the shallow aquifer then moves underground toward a nearby surface water body. In the Pinelands, groundwater discharge accounts for more than 90 percent of streamflow. During times of drought less water will be available to recharge the aquifer, so streams and wetlands will also receive less water.

Water withdrawn from the aquifer by wells can drastically reduce the amount of water available to feed streams and wetlands. Well water is used for a variety of reasons. Municipalities provide well water to their residents, farmers use well water to irrigate their crops, commercial and industrial operations use well water, and golf courses use well water to keep their turf green. Some of these entities are also allowed to take water directly out of streams for their use. Most or all of this water is lost to the groundwater system after it is used. For example,

most water used in agriculture, except for drip-irrigation, is lost to the atmosphere. Household water is used once in our homes and then flushed down the toilet or sent down our sink drains. From there it typically goes to a wastewater treatment plant, and is then dumped either directly or indirectly into the ocean or Delaware River. Millions of gallons of water per day leave the Pinelands in this way. As a result, this water is no longer available to the aquifer and in water supply lingo is considered depletive or consumptive.

On a local level, water withdrawals from high-capacity wells can have profound



This diagram from the United States Geological Survey shows the impact of a well on the availability of water for plants and animals.

impacts on the environment. Wells lower the water table in the area of the well. The more water that is pumped from a well, the larger the area that is impacted.

Depending on the local geologic properties of the aquifer, wells can lower the water table and associated wetlands for thousands of feet in all directions around a well. If the rate of pumping is high enough, streams within the influence of the well can dry up in a short period of time. This is particularly true in September when streams are typically at their lowest. It is estimated that there are over 1,000 high-capacity wells in the aquifer, with yields up to 4,500 gallons per minute. The impact of these and future wells on the Pinelands needs to be considered and addressed.

Water is Not Unlimited in the Pinelands

by Robert Kecskes

Editor's Note: Robert Kecskes recently retired from the NJ Department of Environmental Protection after 35 years, 25 years of which was as Chief of the Water Supply Planning Section.

The New Jersey Pinelands Commission is nearing completion of the Kirkwood-Cohansey Aquifer study. The major objective of this study is to determine how much water can be removed from the Pinelands without adversely affecting its ecological resources. Since the Kirkwood-Cohansey aquifer provides over 90 percent of the water in streams and associated wetlands, the interactions of groundwater and stream flow must be considered together. This is one of the most important studies undertaken by the Commission and will help shape how water is used in the Pinelands in the decades ahead.

A useful way of crudely determining if a region's ecological resources may be negatively affected by withdrawals of water from the aquifer is to first estimate how much water is flowing in the region's streams during periods of drought. Due to the lack of rainfall during drought, flows in streams are naturally low and natural resources that are dependent on freshwater are most vulnerable. Reducing flows substantially more than that which otherwise occurs during drought can significantly stress fish, turtles, plants and other freshwater-dependent organisms.

It is important therefore, to consider whether current and future groundwater withdrawals may further reduce these low flows. The premise here is that the greater the reduction in drought flows as a result of the withdrawals, the greater the stress to the region's ecological resources.

Withdrawals that cause a large fraction of the drought flows to be taken out of the stream or wetland will cause the most harm to the natural resources. This is because substantial reductions to drought flows will result in decreased stream depth, increases in stream temperatures,

inability for a stream to meander, potential losses in food sources, higher pollutant concentrations, and a host of other impacts.

In addition, a determination has to be made of the "depletive" and "consumptive" nature of the withdrawals. A depletive withdrawal is one that removes water from the resource, such as a public water supply withdrawal that is discharged out to sea from a sewage treatment plant or is transferred for use into another watershed. A consumptive withdrawal is one that removes water from the resource through activities such as agricultural or golf course irrigation where most of the water is lost via evaporation and transpiration. In both cases, the water is lost to the streams and wetlands that rely upon it.

Based on NJ Department of Environmental Protection (NJDEP) data, it is estimated that the cumulative drought flow in the 23 watersheds of the Pinelands is about 430 million gallons a day (mgd). Based on NJDEP Data Miner reports, monthly water use data, and NJDEP consumptive use coefficients, nearly 25% of the total drought flow in the Pinelands is presently removed by current depletive or consumptive withdrawals. About 44% would be removed if all the water presently approved was used. In other words, on a regional scale the total flow of Pinelands' streams have been reduced by nearly one-fourth by current withdrawals during low rainfall periods, and nearly one-half of the total flow in Pinelands' streams will "disappear" during future drought as approved withdrawals are fully utilized. Local impacts of groundwater withdrawals will be much greater.

Other issues include the potential that some of the individual watersheds will experience drought flow losses significantly more severe than the cumulative average cited above. Depletive or consumptive withdrawals at already

approved amounts far exceed the total drought flow in some of Pinelands watersheds. Further, it is now acknowledged that withdrawals from the deeper aquifers (e.g., Atlantic City 800-Foot Sands, on which the Jersey shore relies for nearly all its water) also deplete the Kirkwood-Cohansey aquifer and reduce drought flows in Pinelands streams.

Another issue is the fact that the drought flows are calculated at the bottom of watersheds. Drought flows further upstream are lower than those at the bottom of the watershed meaning impacts will be greater in headwater areas. Therefore, from a planning perspective, withdrawals need to be limited so that they don't comprise too large a fraction of drought flows. What are the impacts to drought flows when the withdrawals are located in the headwaters? What are the impacts of these withdrawals on wetlands during drought?

This regional assessment, while somewhat simplistic, raises several issues. Foremost is whether the current loss to drought flow is causing substantial stress to the natural aquatic resources of the Pinelands. Similarly, will these losses affect other human uses? Will loss of freshwater to the brackish estuaries outside of the Pinelands affect fish and shellfish populations? These questions point out that our water resources are not unlimited, and that there is a delicate balance between how much water is available for both human use and the natural world.

References

- NJDEP, NJ Geological and Water Survey, Using the Low Flow Margin Method to Assess Water Availability in New Jersey's Water-Table-Aquifer Systems, Technical Memorandum 13-3, 2013.
- NJDEP, Data Miner, Open Public Records Act, http://datamine2.state.nj.us/dep/DEP_OPRA/.
- NJDEP, Bureau of Water Allocation, Monthly Water Use Data (unpublished), 2003.

Wells Can Suck the Pinelands Dry

by Richard Bizub, Director for Water Programs

This is a bold but true statement based in science and real examples. One thing that is clear from the Pinelands Commission's Kirkwood-Cohansey Aquifer Study is that pumping from wells can alter wetlands and intermittent ponds in profound ways. The \$5.5 million dollar study looked at what ecological changes could be expected from pumping. The findings are startling.

Both stream flows and wetlands are affected by nearby wells. And water levels in wetlands are even more sensitive to both groundwater withdrawal rate and well locations than stream flows are. This means that changes in stream flow as a result of pumping are only a part of the story and maybe not the biggest part. For example, at the sub-watershed scale, by removing just 10% of the water that gets into the aquifer from rain and snow, it is expected that almost 10% of the wetlands will dry up. Yet changes in stream flow would largely go unnoticed. Removing 30% of recharge is expected to result in about 30% of the sub-watershed's wetlands drying up, and reductions in stream flow become more apparent.

PPA applied the findings of the Kirkwood-Cohansey Study to the whole Pinelands area to assess vulnerabilities to wetlands based on the current amount of pumping. Taking into consideration precipitation, recharge, land-use, wetlands and total pumping per sub-watershed, this is what we found. Of the 223 sub-watersheds in the Pinelands, 38 already have pumping in the range of 10% to 52% of recharge. This means that vast areas of wetlands are changing ecologically or are drying up. During times of drought, the number of watersheds exceeding 10% of recharge increases to 43 sub-watersheds. Not surprisingly, in the Preservation Area,

where groundwater withdrawals are strictly regulated, wetland impacts are minimal because withdrawals are typically less than 1% of recharge.

To check our regional approach to looking at existing wetland impacts, PPA conducted a more detailed assessment of three areas of the Pinelands. Using a model developed by the United States Geological Survey (USGS) for the Pinelands Commission as part of the Kirkwood-Cohansey Study, Dr. Amy Karpati, PPA's Director of Conservation Science, applied the model to the following areas: Evesham/Medford, Hammonton Township and Little Egg Harbor/Tuckerton. The model estimates the number of acres of wetlands that will experience a certain amount of water level decline.

For the Evesham/Medford area, water level declines in wetlands are very low relative to the other two areas. The reasons for this are that the public supply wells in this area withdraw water from deeper aquifers and do not use the shallow Kirkwood-Cohansey aquifer. Also, Evesham receives some of its drinking water from the Delaware River. In addition, there are very few agricultural wells. Using a water level decline of six inches as a critical ecological threshold, less than 1% of the wetlands are experiencing this amount of decline.

The Little Egg Harbor/Tuckerton area draws water from the shallow Kirkwood-Cohansey aquifer. In addition, the USGS estimates that 27% of the water withdrawn from another aquifer, the Atlantic City 800-Foot Sands, comes from the Kirkwood-Cohansey aquifer. Thus both aquifers needed to be considered. Using six inches of

water level decline in wetlands as a threshold, approximately 6% of the wetlands in the area would experience this amount of decline.

Wetlands in the Hammonton area show the greatest effects of groundwater withdrawals because of municipal supply wells and over 100 agricultural wells that use the shallow aquifer. It is estimated that approximately 24% of the wetlands in the Hammonton area are experiencing a decline of approximately six inches. In some locations as much as 67% of wetlands are experiencing this amount of decline.

So the key facts are in from the Kirkwood-Cohansey Study, and it's not good news for wetlands and the Pinelands as a whole. It is now up to the Commission to use the findings of their study to protect wetlands for what they are, a unique and important ecosystem of the Pinelands that supports both people and wildlife.

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Groundwater — An Environmental Issue

continued from cover

during the summer of 2000, and within a few weeks nearby wetlands and a stream that feeds a large lake started to dry up. PPA asked NJDEP for a hearing. Based on testimony presented by PPA and others, the well was shut down permanently. In this case swamp pink (*Helonias bullata*), a federally endangered wetlands plant, was in jeopardy. New Jersey is a global stronghold for this plant, containing more than 70% of the known sites.

In another example, a Burlington County cranberry farmer's irrigation pumping resulted in the lowering of a nearby shallow 16-acre lake by a few feet. As a result wetlands within the general area experienced a dramatic loss of water and were in danger of drying up.

Unfortunately, on the East Coast we tend to view water as just another utility like telephone, electricity, sewer, and cable TV. Our attitude is that there's plenty of water. After all, it seems to rain an awful lot and when we need more water we can just drill another well.

As a society we need to see unsustainable groundwater withdrawals as an environmental risk and challenge. We know that the few aquifers available for human use in the Pinelands have been declining at an alarming rate. This is a problem not only for the ecosystem, but for people who depend on these aquifers for drinking water as well.

Unlike northern parts of the state where most drinking water is obtained from surface water sources such as rivers and reservoirs, in South Jersey most of our water is derived from groundwater. As the deeper aquifers become overdrawn, the pressure to use the shallow Kirkwood-Cohansey aquifer will increase. To make matters worse, the law allows water to be exported ten miles outside the boundary of the Pinelands National Reserve. Today

some of the fastest growing communities in New Jersey are located within this 10-mile radius. They will almost certainly look to the Pinelands to fill their water supply needs. It is for this reason that PPA monitors water supply activities beyond the Pinelands boundary.

To determine to what extent the Kirkwood-Cohansey aquifer can be exploited without negative impacts to streams and wetlands communities, the Pinelands Commission embarked on a \$5.5 million study in 2003. They looked at the potential impacts of groundwater withdrawals on stream flow and wetland communities. The study's findings raise a number of concerns. For example, small intermittent ponds are extremely sensitive to groundwater withdrawals. There are over 2,000 such ponds in the Pinelands (see *Remarkable Ponds of the Pinelands*, pg 6). Depending on the location of wells and the volume of groundwater removed, vast areas of wetlands can be impacted by pumping. Not only can pumping wells dry up wetlands, but existing wetlands can be converted to a different type of wetlands, thereby altering Pinelands ecosystems. Stream flow can also be reduced depending on the degree of groundwater exploitation. Of course, during times of drought when there is less rainwater entering the groundwater system, the ecological impacts will be much worse. (see *Water is Not Unlimited in the Pinelands*, pg 3).

With proper planning and regulatory oversight, it is possible to balance the water needs of both people and the ecosystem within the Pinelands. The first piece of sound water supply planning is already in place, the Pinelands Comprehensive Management Plan (CMP). The Pinelands Commission has been using the CMP to minimize gross impacts from groundwater withdrawals in some situations. However, relying on the CMP alone has its limitations.

It is for this reason that PPA will be petitioning the Pinelands Commission and NJDEP to adopt a two-tier strategy to protect water resources for both people and the environment. The first tier should be a threshold set at some regional scale such as a sub-watershed or Pinelands management areas within a municipality. The second tier needs to establish what, if any, impact will be tolerated at a local scale.

Without a two-tier strategy there will not be any long-term protection of water sensitive ecosystems since the current state water allocation process does not regulate cumulative impacts on a regional scale. This system is failing to protect the Pinelands as there are a number of areas that are currently overstressed from too many wells, and yet the Commission and NJDEP continue to allow more groundwater to be withdrawn from these areas (see *Wells Can Suck the Pinelands Dry*, pg 4). If the aquifer is already stressed at the regional level no additional withdrawals should be allowed in the area.

If the aquifer can be used without exceeding a regional threshold, then a potential applicant should be required to show that what is being proposed will not exceed the regional threshold, nor impact nearby wetlands. This would be the local threshold determination. Since wetlands are more sensitive to groundwater withdrawals, by focusing on protecting wetlands, stream flows will be maintained as a consequence.

Maintaining sufficient water levels in the shallow aquifer and streams to meet ecological needs, coupled with growing demands for more water means that the Pinelands Commission will need to take a more aggressive role in critically reviewing future water allocation proposals, and say **No** when necessary to protect the Pinelands.

Remarkable Ponds of the Pinelands

by Russell Juelg, Senior Land Steward, The New Jersey Conservation Foundation

We have mysterious, globally rare wildlife communities in the Pinelands that are intimately tied to small, temporary bodies of water. Biologists refer to these communities as coastal plain intermittent ponds.

Pinelands intermittent ponds usually fill up with fall, winter, and spring rains, but typically dry out in late summer. They are characteristically shallow, topping off at a few inches to a few feet deep. They tend to fill with seasonal rain because of their proximity to the water table, though some also hold water because of clay bottoms.

Most of these ponds are ecologically similar, and they harbor a distinct and fascinating flora and fauna. For example, the Pine Barrens Treefrog has strong affinities to intermittent ponds for breeding. Several other amphibian species that have populations within the Pinelands are restricted or nearly restricted to such habitats for breeding, such as the Northern Gray Treefrog, Southern Gray Treefrog, and Fowler's Toad.

In addition to these species, many other species, such as Green Frogs, use both intermittent ponds and permanent bodies of water for breeding. Each species has its own unique natural history, but the typical pattern involves a spring migration of breeding adults to the ponds. After mating and egg laying, the adults of most of the species depart, and the young—if successful—have enough time to fully develop and metamorphose before the pond dries out in the summer.

This behavior takes advantage of one of the primary attributes of an intermittent pond: the absence of predatory fish.

Fish aren't the only organisms that can't colonize intermittent ponds. Most plant species find these habitats untenable, as well. For example, woody species are entirely absent from regularly-inundated portions of such ponds, and many strictly aquatic plants have, at best, an ephemeral life that gets cut off when the ponds dry out.

Since the plant species that favor these ponds are relatively few, and the habitat itself is rare, many of the plant species found in such ponds are also rare. Awned Meadowbeauty, for example, critically imperiled in New Jersey and vulnerable to extinction throughout its range, is found in only six states.

Hirst Brothers' Panic-grass was first discovered in an intermittent pond in the Pinelands, is critically imperiled globally, and is currently known to exist in only three states. Several other species are similarly rare and imperiled.

Scientists at the Pinelands Commission have studied these ponds and have produced several reports. The fundamental conclusion is that the plants and animals in these ponds are extremely vulnerable to withdrawals from the Kirkwood-Cohansey aquifer system. The level of vulnerability is complicated by factors such as the proximity of any given well, the amount of water pumped, seasonal factors, and the size and depth of the pond. But the bottom line, as common sense would suggest, is that, to the extent you reduce the habitat, you harm the elements of biodiversity in that habitat.

The question then becomes, "How much harm can someone do to these communities without violating the CMP?" While the Pinelands

Commission struggles to answer this question, the public has the opportunity to weigh in. The average citizen is likely to be dazzled by the bewildering nature of the regulations and the many possible interpretations of those regulations, but we can, nevertheless, demand that they be enforced strictly.

Meanwhile, now is an excellent time to explore these sites and marvel at their beauty and complexity. By day, the scene is dominated by graceful vegetation, dragonflies, birds, and mysterious ripples on the water. By night, the scene is dominated by the calls of frogs, the sounds of nighttime birds, and reflections from the sky.

Many of these ponds are as alive today as they were when the Pinelands Commission came into existence. And for good reason. They are magical places.

Pinelands Commission Meetings

Their regular monthly meetings are open to the public and they need to hear from you. Upcoming meetings:

August 8, 9:30 am
September 11, 6:00 pm

NJ Pinelands Commission
15 Springfield Rd.
New Lisbon, NJ 08064

PINELANDS WATCH

Stay up to date on important issues - sign up for the Pinelands Watch Newsletter.

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Calendar of Events

Pinelands Programs and Field Trips

July to September 2014

The events listed below are just a few of the great Pinelands trips this summer.

Visit www.pinelandsalliance.org and click on **Event Calendar** for a complete listing of Pinelands programs and trips provided by a wide variety of groups and organizations.

Nothing at Whitesbog

Fri., July 25, 7:30 pm, Whitesbog Village, Brendan Byrne State Forest

Enjoy a short presentation about moths followed by up-close observation of moths attracted to lights at three different viewing stations. Bring the kids, a flashlight and chair to enjoy. Refreshments and local crafts available for purchase at the general store. Whitesbog Village is located at 120-34 Whitesbog Road, Browns Mills. Email Bernie.pinebarrensmother@comcast.net. FREE.

Moth Night at Parker Preserve

Sat., July 26, 7:30 pm, Franklin Parker Preserve, Chatsworth

Meet at the NJ Conservation Foundation's Franklin Parker Preserve for a night of viewing moths and other insects. Come early and explore 9,400 acres of Pinelands woods and swamps. Bring a chair, flashlight and a snack. Visit www.njconservation.org for directions. Meet at the north gate entrance on Route 532 across from Chatsworth Lake. Email Bernie.pinebarrensmother@comcast.net. FREE.

Starwatch at Batsto Village

Sat., Aug. 2, 7:00 pm, Batsto Village, 31 Batsto Rd, Hammonton

Enjoy an astronomy presentation and starwatch. This is a FREE event and is ADA Accessible. Astronomy presentation is run by the Willingboro Astronomical Society. Call 609-567-4559.

Rare & Interesting Pine Barrens Wildflowers

Sat., Aug. 9, 1pm to 3pm, Batsto Village, 31 Batsto Rd, Hammonton

This presentation by Michael Hogan is part of the *Beyond the Barrens: A Pinelands Speaker Series*. Program takes place in the Batsto Visitor Center Auditorium. Admission is \$2.00 per person. Call 609-561-0024.

Civil War Soliders at Batsto

Sat., Aug. 9, 9am, Batsto Village, 31 Batsto Rd, Hammonton

Civil War encampment, tours of the mansion and more. The Batsto Post Office, one of only four in the United States authorized to operate without a zip code, will be open to cancel your pre-stamped mail. Batsto mansion will be open for tours for a small charge from 10AM - 3PM. \$5/car through Labor Day.

Canoe/Kayak the Oswego River (Burlington Co)

Sun., Aug. 9, 8:30 am, Sponsored by the West Jersey Chapter of the Sierra Club

Rise and Shine - join us for an early trip before the crowds! We'll paddle 8 miles from Lake Oswego to Harrisville Lake. Boats can be rented from Mick's Pine Barrens Canoe/Kayak Rental 800-281-1380 or www.mickscanoerental.com Contact leaders to confirm trip and participation. George & Leona F, 609-259-3734 or Leona@pineypaddlers.com

Walk on the Wild Side Hike

Sun., Aug. 10, 1:30 pm, Offered by Woodford Cedar Run Wildlife Refuge (Medford, NJ)

Join Cedar Run's educators for a themed hike through their many trails. \$10/adult, \$8/child age 4 and up, ages 3 and under free. Advanced registration required. Call 609-983-3329. www.cedarrun.org

Night Hike at the Refuge

Sat., Aug. 16, 7:30 pm, Offered by Woodford Cedar Run Wildlife Refuge (Medford, NJ)

Follow the trails from dusk to dark in search of some of our nighttime visitors. \$10/adult, \$8/child age 4 and up, ages 3 and under free. Advanced

registration required. Call 609-983-3329.

Canoe/Kayak the Wading River (Burlington Co)

Sun., Aug. 27, 9 am, Sponsored by the West Jersey Chapter of the Sierra Club

This is a 13 mile trip for experienced Pines paddlers; expect downfalls and portages. Rentals are not available. Contact leaders to confirm trip and participation. George & Leona F, 609-259-3734 or Leona@pineypaddlers.com

Hammonton Green Day Festival - Hammonton, NJ

Sat., Sept. 13, Noon to 4pm, St. Joseph's High School, 328 Vine St.

Have fun, get tips on how to live more sustainably and purchase products that prove "the good life" can actively promote a healthy environment. Call 609-335-2750 for more info. PPA will have a table at this event.

Walk on the Wild Side Hike

Sun., Sept. 14, 1:30 pm, Offered by Woodford Cedar Run Wildlife Refuge (Medford, NJ)

Join Cedar Run's educators for a themed hike through their many trails. \$10/adult, \$8/child age 4 and up, ages 3 and under free. Advanced registration required. Call 609-983-3329. www.cedarrun.org

Night Hike at the Refuge

Sat., Sept., 20 6:30 pm, Offered by Woodford Cedar Run Wildlife Refuge (Medford, NJ)

Follow the trails from dusk to dark in search of some of our nighttime visitors. \$10/adult, \$8/child age 4 and up, ages 3 and under free. Advanced registration required. Call 609-983-3329.

Get your event listed!

Contact Becky at 609-859-8860 ext. 21 or email becky@pinelandsalliance.org to have your Pinelands event listed in our online calendar or in our newsletter.



Pinelands Preservation Alliance

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Sponsors receive a copy of *The Pine Barrens: Up Close & Natural* DVD
Patrons receive John McPhee's seminal book *The Pine Barrens*
Benefactors receive *The Pine Barrens of New Jersey*, a photographic history of this region
Chairman's Circle members receive the book *Seasons of the Pines* and a personalized tour of the Pinelands

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