

Protecting Down Jersey Rivers

A Guide to Eco-alternatives for Maurice River Watershed Residents



South Jersey's Leading Watershed Organization

THE MAURICE RIVER WATERSHED

WATERSHED — A watershed is an area that drains all the rainfall from elevated terrain to a common outlet at a lower altitude. The ridges and hills separating one watershed from neighboring watersheds are called drainage divides. The Maurice River Watershed consists of surface water: creeks, streams, rivers, lakes, wetlands; and underlying ground water. Larger watersheds contain many sub-watersheds. A watershed's water quality and quantity are dependent on the health of the whole system. Land use practices within a watershed affect the system's health.

- The Maurice is a sub-watershed of the Delaware River, and the Delaware River is a sub-watershed of the Atlantic Watershed.
- The Maurice River Watershed drains approximately 386 square miles.
- The river's ground water supply comes from the Kirkwood-Cohansey Aquifer.
- The Maurice's surface water includes waterways like Muddy Run, Menantico River, Muskee Creek, and Manumuskin River, which are sub-watershed areas of the Maurice River.
- The outflow point of the Maurice River Watershed is the Delaware Bay.

DELAWARE RIVER BASIN

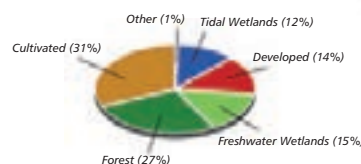


Map: Delaware River Basin Commission, www.drbc.net



MAURICE, SALEM, AND COHANSEY RIVERS WATERSHED — LAND COVER

This rendering exaggerates the topography of the watershed area to emphasize elevation-related trends in land cover and land use.



Cumberland County Residents...

Vital Partners for Regional Health

The Maurice River Watershed has remarkable water quality, abundant open space, and plentiful biodiversity, no small feat for a region in America's most densely populated state. However, its integrity is continually at risk of being compromised by poor land-use practices.

When the workings of a watershed are impaired, there can be concerns:

- heightened flooding
- surface run-off
- ground erosion
- change in water flow
- invasion of exotic plant species
- loss of forested land
- decreased protection of properties from storm surges

The condition of streams and rivers is a reflection of the diverse land uses within the watershed. Land management decisions made on residential properties ultimately impact the

health of the entire river basin and community. Poor land-use begets dirtier water, less water, and damaged habitat; while **good land use promotes...**

- better water quality
- water regeneration
- healthy habitat

In this guide, **Citizens United to Protect the Maurice River, Inc. (CU Maurice River)** offers information on green alternatives for your property, while also providing contact information for local and regional organizations that can support your efforts.

We also invite you and your family to participate in the many outings, workshops, presentations, and social gatherings organized by CU Maurice River. Join other nature enthusiasts who appreciate *Down Jersey's* remarkable historical values and take advantage of the Wild and Scenic Maurice River's exceptional natural and recreational resources.

Be Proactive...

*Making simple changes to land-use practices or beginning one green-minded project at a time can make a much-needed difference for **Down Jersey** community health.*

A River Worth Protecting

The Maurice River Watershed, with its abundance of natural resources, has been home to vibrant cultures and enterprising ways of life for hundreds of years. Along its shores, hunters and gatherers, millers and miners, farmers and fishermen, oystermen and shipbuilders, and a wealth of industrious and creative individuals contributed to the lifestyle, tradition, and lore of our *Down Jersey* region. Remnants of the past — the East Point Lighthouse, the Burcham Farm, fishing and boat-building villages — illustrate the existence of a symbiotic relationship between community and ecological health that still exists today. In caring for local architectural, agricultural, maritime, and natural outstanding resources, we act as responsible stewards for sustaining *Down Jersey* as a dynamic place.

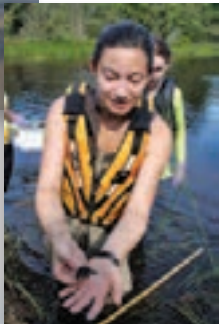
A National Treasure in Your Backyard

In 1993, 35.4 miles of Maurice River and three of its tributaries, the Menantico, Manumuskin, and Muskee Rivers, became part of the National Wild and Scenic River System, recognizing the waterway's scenic, natural, cultural, and recreational attributes.

This designation, created by Congress in 1968, was established to safeguard and preserve the special qualities and character of selected rivers. Encouraging comprehensive policies for river management, the preservation and thoughtful development of these systems will ensure that future generations can appreciate and enjoy them.

The National Wild and Scenic River System currently encompasses 12,709 miles of 208 rivers, less than one quarter of one percent of the nation's rivers.

Citizens United to Protect the Maurice River and its Tributaries, Inc. (CU Maurice River) was a fundamental player in the designation of the Maurice River. Today CU Maurice River, in partnership with local and national environmental organizations, continues its efforts to protect this valuable regional asset.



Mapping the Flow

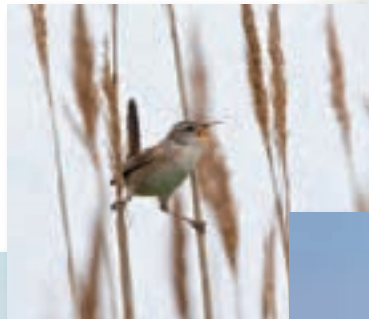
The Maurice River Watershed is a critical link between the Pinelands National Reserve and the Delaware Estuary, forming a resource-rich corridor between the northern upland forests and the bay to the south.

The headwaters of the Maurice River are the product of natural drainage processes of the southwestern portion of the Pinelands National Reserve. There, rainfall recharges the groundwater table and runs off the surface, filling topographical depressions. The overflow creates a web of small streams running down to sea level. As they converge, larger waterways are formed.

The confluence of two Pineland streams — Scotland Run and Still Run — at Willow Grove Lake marks the beginning of the approximately fifty-mile-long Maurice River, which traverses Franklin Township, Buena, Vineland, Millville, Maurice River Township, and Commercial Township. Snaking through forest and grassy wetland, twisting and bending to follow the lowest terrain, the river acquires its curvy shape, typical of coastal plain waterways.

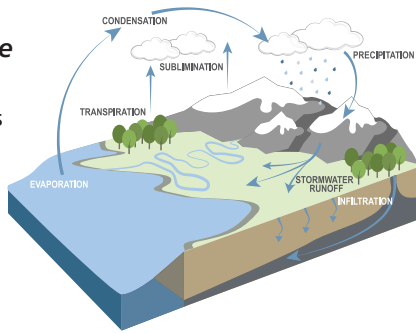
As the river flows, it picks up more surface water run-off from its sub-watersheds. Major tributaries — Muddy Run, Menantico Creek, Manumuskin River, and Muskee Creek — increase the volume of the Maurice River. At its confluence with the Delaware Bay the river is a mile wide.

The Maurice River is one of Delaware Bay's largest tributaries, second only to the Delaware River. On average it discharges 117 cubic feet per second of fresh water into the bay. Its clean water is critically important for traditional industries such as oystering, crabbing, and fin-fishing.



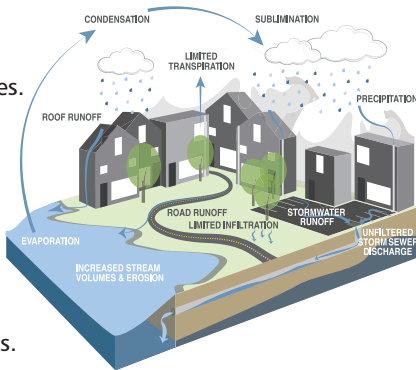
Natural Water Cycle

When unobstructed, Earth's water is always in movement. It is recycled and reused through transfer processes as illustrated here.

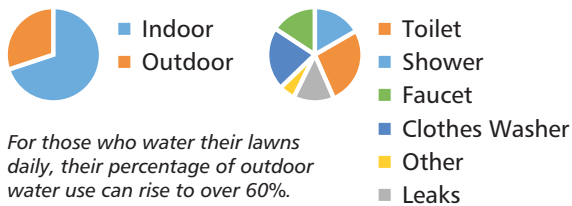


Urban Water Cycle

Urban sprawl impairs water transfer processes. Deforestation, impermeable surfaces, water diversions, and chemical use in land management practices are wasting and contaminating drinking water supplies.



Household Water Use



EXPLANATION

- COASTAL PLAIN AQUIFERS**
- Kirkwood-Cohansey aquifer system
 - Atlantic City 800-foot sand
 - Wenonah-Mount Laurel aquifer
 - Englishtown aquifer
 - Potomac-Raritan-Magothy aquifer system
 - Confining beds and minor aquifers
- NON-COASTAL PLAIN AQUIFERS**
- Aquifers in the Newark Group
 - Valley and Ridge sedimentary units
 - Highlands crystalline units
- Southern limit of Wisconsin glacial terminal moraine
 --- Trace of cross section



Kirkwood-Cohansey Aquifer — Residents of the Maurice River Watershed don't get their water from reservoirs, but rather from the ground water reserves of the aquifer below our feet. The Kirkwood-Cohansey Aquifer also supports the coastal plain's sensitive wetland and aquatic habitats.

Water Conservation

Restoring Ground Water Levels

Between 1950 and 2010, Cumberland County's population grew from 88,597 to 156,898 residents. In that 60-year period, the county saw a 120% increase in housing units. This growth brought with it a higher demand on the aquifer.

Traditionally, building, living, and land management habits didn't focus on minimizing residential water withdrawal or maintaining water within its natural cycle. This has led to the depletion of water levels throughout the Kirkwood-Cohansey Aquifer, causing increased salt-water intrusion, heightened risk of flood damage during storm surges, and reduced surface water.

As knowledge of aquifer recharge and the human effect on the natural water cycle improves, it has become apparent that simple changes to how properties are designed and managed can help restore water levels and protect local water reserves.

This boils down to two management basics —

A) REDUCE WATER CONSUMPTION

B) PROMOTE WATER ABSORPTION INTO THE GROUND

By implementing a simple project to reduce water consumption and/or stimulate water recharge, your property could make the difference!

Did you know...

- Only 1% of the Earth's water is suitable for drinking. Natural water cycle processes cannot filter salt out of sea water as fast as humans are consuming fresh water. Traditional stormwater infrastructure is designed to wash rechargeable or reusable water into waterways that spill into a sea. There it becomes salt water.
- In medieval Europe people consumed around three to five gallons of water per day. Today USGS estimates that one individual consumes approximately 80-100 gallons per day. There are more than 8.9 million New Jersey residents.
- According to the USGS, Cumberland County consumes just under 59,000,000 gallons of water per **day**. 41,000,000+ gallons come from the aquifer.
- Cumberland County ranks 16th in population size of the 21 New Jersey counties, but tenth in **domestic consumption** of fresh water (4,840,000 gallons per day).
- Just one hour of lawn watering typically equals what a family of four uses otherwise in a day.

Being Water-Wise Outdoors

The best way to reduce your overall water consumption is by **reducing lawn coverage**. You can replace your lawn with stunning native flowers, shrubs and trees that require less water to thrive in South Jersey's climate than species introduced from other areas. If you can reduce your lawn by just 10%, you will be on the right track for promoting water conservation while also bringing wildlife back to your yard.

See **Go Wild** section for more details.

Planting a native tree or two does wonders for water and air quality — and property value!

- One tree can store 100+ gallons of water depending on species and size.
- Trees help stabilize soils, recharge groundwater supplies, reduce stormwater run-off, and cleanse both water and air of toxins.



Right: Diagram of water movement through trees.
Source: US EPA 2013

Plant some of these native trees and shrubs...

CANOPY

Virginia pine	River birch
Pitch pine	Sycamore
Pin oak	American holly
Sweet gum	Beech
Willow oak	Tulip tree
Post oak	

UNDERSTORY

Blueberry	Elderberry
Huckleberry	Spicebush
Beach plum	Inkberry
Inkberry holly	Sweet pepperbush
Bayberry	Winterberry
Mulberry	



Cut back on watering your lawn

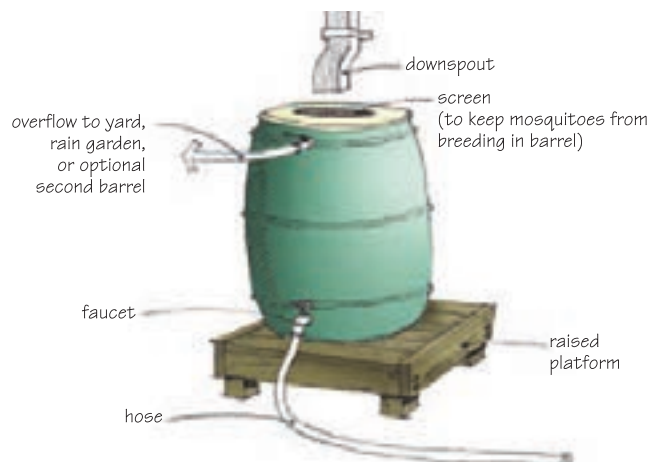
One inch of water per week is sufficient.

- Water on an *as-needed* basis, versus on a schedule.
- Water based on the weather report. Turn sprinklers off if it has rained or is going to rain. A hard rainfall can maintain a lawn for two weeks.
- Deep soak your lawn to avoid evaporation. You won't need to water as frequently.
- Apply water only as the soil can absorb it. If there is a puddle, you are watering too fast.
- Water after sunset or in the earliest hours of the morning but always before 9:00 am.
- Periodically, make sure sprinklers are watering lawn rather than streets, driveways, pathways, etc.
- Consider installing drip irrigation systems instead of sprinklers in garden beds.
- Mulch and leave grass and leaf clippings to keep in moisture.
- Raise your lawn mower to cut grass at three inches; this will keep moisture in and reduce burning.

Make the best of rainy days!

RAIN BARRELS

Water collection in rain barrels is an age-old practice that helps people store precious water for later use. It can be used for irrigation or other purposes especially during dry spells. Use of stored water will reduce stress on the aquifer, lower the amount you spend on water, and conserve the municipal water supply.



Conserving Water Indoors

Every drop counts...

Fixture/Appliance	Easy Ways to Conserve Water Indoors	Do It Yourself
SHOWER HEAD	<ul style="list-style-type: none"> ■ Shower instead of bathing. ■ Reduce the time you wait for warmer water. ■ Catch and reuse water wasted waiting for the shower to warm up. ■ Take shorter showers. ■ Turn the water off while you soap up. 	<p>Install a low-flow showerhead.</p> <p>You can reduce your showerhead's flow by 2.5 gallons per minute or more.</p>
BATHROOM SINK	<ul style="list-style-type: none"> ■ Turn water off while brushing your teeth and shaving. ■ Turn water off while soaping up your hands. 	<p>Install low-flow faucet aerators on bathroom faucets and save 1 gallon per minute.</p>
TOILET	<ul style="list-style-type: none"> ■ Don't throw unwanted items in the toilet. Use a trash can instead. ■ You've heard it before, "<i>If it's yellow, leave it mellow.</i>" Lower the toilet bowl lid to keep the contents out of sight. 	<p>Make a tank-bank.</p> <p>Take a plastic bottle, fill it with sand, and place it in your toilet tank. Save up to 10 gallons a day.</p>
KITCHEN SINK	<ul style="list-style-type: none"> ■ Don't run water until cool. Store water in the refrigerator. ■ Minimize the use of your garbage disposal by composting. ■ Once cooled, boiled cooking water can be reused on outdoor plants. They benefit from the vitamins and proteins in the water. ■ Fill the sink or a bowl to wash dishes. Don't let the faucet run. ■ Put soapy dishes in a rack and rinse all together. ■ Catch wasted water and use it to water plants. ■ Wash vegetables and fruits in a bowl. Then reuse the water outside. 	<p>Avoid buying bottled water.</p> <p>It takes 1.5 gallons to make a bottle that only holds 16 oz. of water. Add a water filter to your kitchen sink for purer water and refill personal water bottles time and again.</p> <p>Compost</p> <p>There are many compost container options for residential areas.</p>
DISHWASHER	<ul style="list-style-type: none"> ■ Use the shortest wash setting. ■ Don't rinse dishes before putting them in the dishwasher. ■ Run full loads of dishes. 	<p>Use an Energy Star dishwasher.</p> <p>It is quite difficult to wash dishes more efficiently by hand.</p>
WASHING MACHINE	<ul style="list-style-type: none"> ■ Skip on the extra rinse cycle. ■ Select the appropriate water level for the load's size. ■ Run full loads of laundry only. 	<p>Use an Energy Star clothes washer and dryer.</p>
<p>WHEN IT IS TIME, REPLACE ...fixtures with those carrying the WaterSense label. ...household appliances with those labeled Energy Star. They are water- and energy-efficient options.</p>		



Get rid of those pesky leaks...

On average, 10 gallons of your water footprint is lost to leaks each day.

FAUCETS	PIPES	TOILET
Place a measuring cup under your faucets. Leave it there for half an hour. Then multiply the amount in the cup by 48. The result equals the amount of water lost in a 24-hour period.	Use your water meter to check for hidden leaks in your pipes. Turn your house's water off. Then check the meter. If it is still registering water use, you have a leak!	Many toilets leak constantly. To check your toilet, simply put food dye in the tank. If the water in the bowl turns color, your toilet has a leak!

Understanding Water Pollution

Sources of Water Pollution

When the Maurice River was designated as a Wild and Scenic River in 1993, the upper sections of the Menantic and Manumuskin tributaries were classified as having either pristine or potentially pristine water quality. This still holds true today. The unspoiled waters of these tributaries are crucial for sustaining the health of the forested corridors that purify the air we breathe and support an abundance of wildlife, both common and rare.

Along these streams and their headwaters, local environmental non-profits and governmental organizations have preserved vast tracts of land that serve as buffers. This open space allows natural filtering and water cycle processes to remove unwanted contaminants before they make their way into ground- and surface-water resources. Developed areas can better complement these open spaces if they are managed with water integrity and wildlife habitat in mind.



There are two principal contributors to water degradation in the Maurice River Watershed:

Point Source Pollution ●

When contamination has an identifiable emitter it is known as point source pollution. Prior to the Clean Water Act of 1972, polluters were able to freely compromise the integrity of future generations' water quality, public health, welfare, and safe use of water resources for personal gain.

Today the Environmental Protection Agency (EPA) and State of New Jersey (DEP) are able to enforce water quality regulations and monitor known discharge points to keep hazardous effluent within safer limits. So far, within the Maurice River Watershed five historic industrial establishments have been identified as hazardous waste sites and included on the EPA's Superfund list. These industries are mostly located north of Union Lake, but the toxins they released can be found in different sections along the Maurice River. The crucial clean-up efforts came with a heavy cost to the general public's wallet.

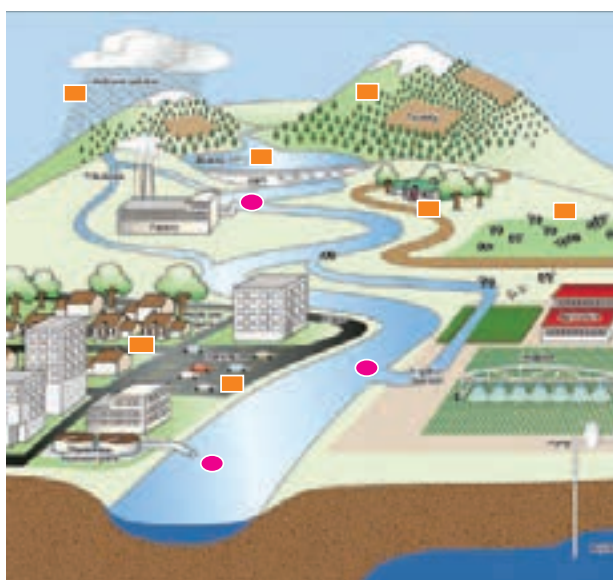


Image courtesy of Government Accountability Office's article "Clean Water Act: Changes Needed If Key EPA Program Is to Help Fulfill the Nation's Water Quality Goals."

No matter the amount, report spills of any hazardous or chemical waste into surface water by calling the New Jersey Department of Environmental Protection (DEP) emergency hotline at 1-877-WARNDEP (1-877-927-6337). This line can be used to report environmental incidents, abuses, and complaints.

How can individuals help?

- Support politicians who act with the water resource in mind, hold public officials responsible for their environmental record, and vote for clean water and open space initiatives at the ballot box.
- Show solidarity with local conservation non-profits by volunteering and/or donating.

Non-Point Source Pollution ■

Precipitation falls on higher land and flows down to lower elevations. As it runs over surfaces and through pipes it accumulates pollution from poor land-use practices before ultimately discharging into rivers and lakes without any filtration.

The EPA considers non-point source pollution to be the current leading cause of water pollution. Its origin is almost impossible to identify since it originates from nearly every property, mixing with other sources of run-off before being released into waterways. Gutters, impervious surfaces, drains, and pipes were engineered to divert water from homes, businesses, parking lots, and other developed or landscaped spaces. While this infrastructure is designed to protect our properties, it is a source of real concern when it comes to water quality.

Through green-minded practices you can reduce the amount of water and contaminants coming off your property. When managed correctly, our properties will contribute to restored water quality, increased ground water levels, and overall environmental integrity.

The following six pages offer ideas for reducing non-point source pollution.

The image consists of two side-by-side illustrations comparing traditional stormwater management with a sustainable approach.

Left Illustration (Traditional): Shows a house with a brown roof. Blue arrows indicate "RUNOFF FROM ROOF" falling onto the lawn and "GUTTER RUNOFF" falling onto the street. "LAWN RUNOFF" is also shown. These flows combine into "STREET RUNOFF" which enters a storm drain. A large blue arrow points from the storm drain into a body of water (a bay or stream) where fish and a turtle are shown. Text at the bottom reads: "STORMWATER RUNOFF ENDS UP IN LOCAL STREAMS, CREEKS, RIVERS AND THE BAY." A cloud is in the sky.

Right Illustration (Sustainable): Shows the same house but with various green infrastructure elements. "RUNOFF FROM ROOF" is captured by "RAIN BARRELS" and "REDIRECTED DOWNSPOUT". "TREES CAPTURE RUNOFF" is shown. "RAIN GARDENS CAPTURE GUTTER & LAWN RUNOFF" is shown. "PERMEABLE PAVERS" are shown on the driveway. "CURB CUTS REDUCE STREET RUNOFF" is shown. A large blue arrow points from the storm drain into the body of water. Text at the bottom reads: "Keep pollutants out!"

Image courtesy of NCDENR

- *Slow the flow of stormwater on your property.*
- *Promote water infiltration and filtration.*
- *Replace chemical compounds with biodegradable ones.*
- *Reduce biological waste coming off your property.*

Understand and Control the Flow

Slow It Down and Spread It Out

How does your property channel rainfall?

On a rainy day follow the flow of water on and off your property.

- Do downspouts channel your stormwater onto impermeable surfaces or catch basins?
- Does your property have impermeable sidewalks, pathways, or driveways that are washing water off your property?
- Are sections of your property too wet or dry?
- Once off your property, where does the water go?

Consider these water-friendly ways to channel water:

- Consider replacing hard surfaces with porous materials like shells, gravel grids, permeable pavements, grass pavers, interlocking pavers, flat stones, and bricks over a bed of sand or gravel.
- Line impermeable surfaces with depressed gravel gutters.
- Use berms and swales, landscape contours designed to redirect water for improved drainage and absorption into the ground.
- Extend downspouts towards garden areas for absorption.
- Consider a rain barrel to catch water for lawn and garden irrigation.
- Replant bare spots in your garden with native trees, shrubs, or flowers versus lawn to minimize erosion.

Rutgers Cumberland County Cooperative Extension website is an excellent resource for sustainable property management.

For learning resources: www.njaes.rutgers.edu/garden/

For a local point of contact:
www.cumberland.njaes.rutgers.edu

Soak It In

Increase rainwater infiltration.

As water infiltrates the ground, it is cleansed of many pollutants through a combination of natural physical, biological, and chemical processes. Filtration reduces the amount of contaminants being carried away from properties by storm-water run-off.

- Reduce lawn size by opening garden beds for native flora species. These plants have more complex root systems than exotic grasses, which improve the soil's ability to infiltrate water and withstand wet or erosive conditions.
- Let grass cuttings and leaves lie where they fall. This will help retain moisture and add nutrients to soil.
- Maintain the health of mature trees whose penetrating roots prevent erosion and increase aeration and drainage.
- Install a native-plant rain garden on your property.
See box below for more information.



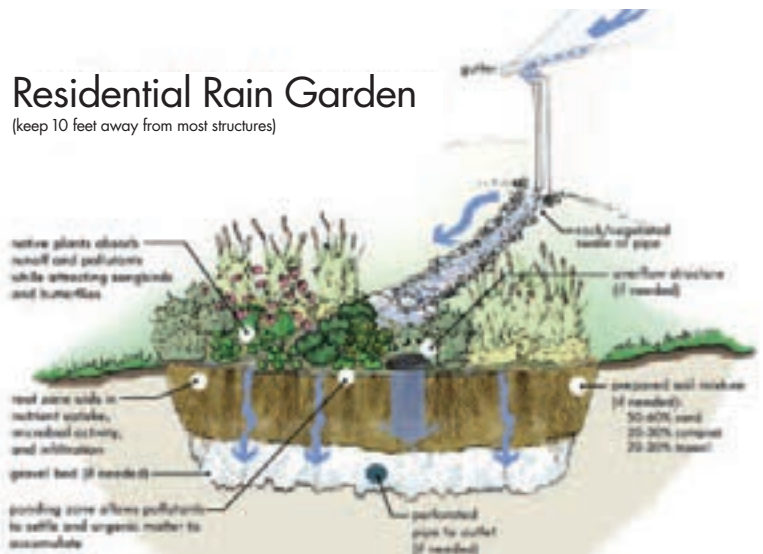
The Nature Conservancy and CU Maurice River volunteers build a rain garden at the Millville Public Library.

RAIN GARDENS

These gardens promote up to 30% more absorption of water into the ground by slowing down and redirecting the run-off on your property away from impermeable surfaces and stormwater catch basins. The water is directed into a garden of native plants, where complex root systems draw water down and start filtering out contaminants. Rain gardens create naturally beautiful areas full of color that attract and feed more species of native pollinators than do exotic plants. In order to find the best place for a rain garden on your property and to choose appropriate species for that area, check out the Rutgers Rain Garden Manual of New Jersey, available on the university's site, or connect with CU Maurice River for more information.

Residential Rain Garden

(keep 10 feet away from most structures)





Greener Grass

Your outdoor spaces can be healthier and safer for your family, friends, pets, and neighbors. Reduce or eliminate lawn to minimize your family's exposure to harmful chemicals. For remaining grassy areas, look into organic lawn care alternatives.

Go Green...

Reducing the use of harmful chemicals

FERTILIZERS

Fertilizers are one of the most noxious and prevalent pollutants in the United States. They are overused on properties to keep exotic plant species alive.

- Plant native flowers, bushes, shrubs, and trees that thrive better in the local natural environment without fertilizers or excess watering that exotic plants need.
- Let your lawn mower do the work! Mulched leaves and grass will decompose and return nutrients to the soil.
- Compost to create your own valuable fertilizer and soil conditioner.



EUTROPHICATION is the overabundance of nutrients, phosphates, and nitrates in water which causes excess algae growth leading to the depletion of oxygen levels. It is the largest pollution problem affecting U.S. coastal waters. The two most significant sources of nutrient pollution are septic systems and run-off from lawns and impermeable surfaces.

If you use fertilizers, do so wisely...

- Don't fertilize before it rains.
- Test for nitrogen (N), phosphorus (P), potassium (K), and soil acidity (pH) levels; add only what is necessary.
- Use slow-release fertilizers.
- Know the size of your yard. Length X width = square feet. Subtract the square footage of your house, driveway, or any permanent features for your yard size.
- Calibrate your spreader for each application.
- Place a tarp under your spreader when loading it.
- Follow label directions on fertilizers.
- Keep fertilizer off impervious surfaces.
- Clean spills immediately:
 - Sweep up dry fertilizers and reuse them.
 - Use an absorbent material to soak up liquid spills. Have a gel or clay-based granule, or absorbent pad or towel on hand.

PESTICIDES

The U.S. Environmental Protection Agency estimates that about 80 million U.S. households dump nearly 90 million pounds of herbicides and insecticides in yards a year. These chemicals are pervasive in the environment due to a combination of widespread overuse and storm water run-off. Constant exposure to these chemical compounds during childhood is believed to have real consequences on human health.

Herbicides

Don't spread herbicides over your entire lawn area. If 5% of your lawn is weed, the other 95% of the herbicide used is only contaminating your outdoor living space.

- Try to remove weeds by hand first.
- Spot treat each weed individually.
- Use one of the many organic alternatives to chemical herbicides on the market.
- Experiment with homemade weed killers made from natural household items.

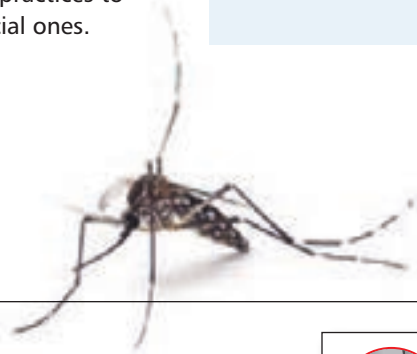


Insecticides

90% of the insects in your lawn don't pose a risk to human health and are an important food source for wildlife. Pesticides eradicate both nuisance and beneficial insects. Consider Integrated Pest Management (IPM) practices to control unwanted insect populations without killing off beneficial ones.



Lady bugs aren't just adorable, they are also major predators in the insect world (biological control).



IPM Control Methods

To decide on your control method: 1) identify the species; 2) know where they live, what they eat, and where/how they reproduce; 3) choose one of the IPM methods below.

- Cultural** Modify the pest's environment or habitat by choosing pest-resilient native plants, pruning affected limbs, and removing infected plants.
- Biological** Introduce the pest's natural enemies (predators, pathogens, or parasites). You can purchase native insects to combat the nuisance species, but be careful not to import exotic varieties which are harmful to native ones.
- Physical** Control insect populations using steam sterilization, barriers, mechanical traps, or other practices.
- Chemical** In IPM, chemical controls are a **last resort** and are used in tandem with the previous control methods.

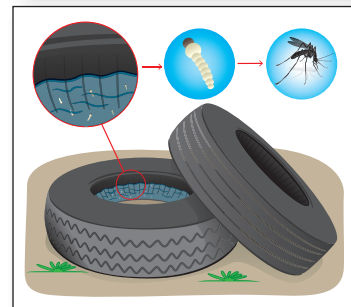
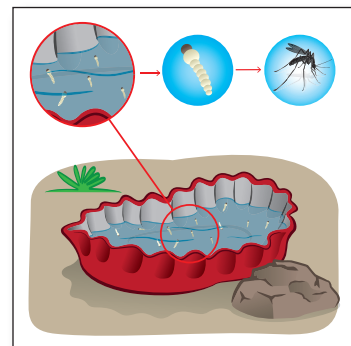
Dreaming of a yard without mosquitoes?

Container mosquitoes can hatch in a basin as small as a bottle cap. One vehicle tire lying around, collecting water, can produce hundreds of thousands of mosquitoes. They are an environmental threat and promote the spread of mosquito-borne diseases.

There are easy and harmless ways to reduce this nuisance:

- **Tidy up** your backyard by getting rid of containers that hold water.
- **Dump and drain** water from any and all containers.
- **Scrub** the same containers to clean any leftover eggs.
- **Prevent hatching** by placing a container of water laced with BTI granules.
- **Remember** to unclog gutters, keep birdbaths fresh, and examine crawl spaces and basements for puddles.

If mosquitoes are still a nuisance in your yard or if nearby properties are harboring them, call Cumberland County Mosquito Control: (856) 453-2170.



CLEANING AGENTS

For human health it is best that we avoid bringing hazardous chemicals and poisons into our homes. This includes certain ingredients in soaps, detergents, cleaning products, and many others. For personal and environmental health switch to organic products and/or try natural cleaning agents.



Alternatives to harmful chemicals.

Try these non-toxic home cleaning and care agents alone or in combination.

- Natural soap
- Lemon juice
- Baking Soda
- Hydrogen Peroxide
- Cooking oils
- Vinegar
- Essential oils
- Salt

You can find all sorts of effective natural cleaning solution recipes online.

Try this website for example:

<http://www.keeperofthehome.org/2013/06/homemade-all-natural-cleaning-recipes.html>

Need a manufactured cleaner?

For a list of safer products approved by the EPA, go to <https://www.epa.gov/saferchoice/products#sector=Home>

REALITY CHECK!!

Local sewage treatment plants remove biological waste — NOT chemical waste — from water. Components of cleaners, greases, medicines, soaps, etc., are washed down our drains and into surface waters daily.

HAZARDOUS WASTE DISPOSAL

- If a product label says DANGER or POISON, or if the product is highly flammable or combustible, corrosive, toxic, or explosive, it is considered hazardous and must be taken to a hazardous waste disposal site. **Do not** empty it in the sink, yard or drainage systems as this contaminates local surface waters.
- The Cumberland County Improvement Authority organizes three hazardous waste drop-off days a year. They accept used motor oil, antifreeze, car batteries, old gas, fuel oil, oil-based paints, stains, cleaning chemicals, garden chemicals, corrosives, and propane tanks. Some municipalities have drop-off points year 'round.
- Electronics contain toxic chemicals that can escape into the local environment if they are not disposed of properly. TVs, monitors, printers, laptops, fluorescent bulbs, etc., are not picked up curbside in Cumberland County. You can bring them to your city's municipal drop-off points. Contact your municipality for hours and locations.



For more information on hazardous waste disposal contact:

Cumberland County Solid Waste Complex

169 Jesse Bridge Road • Rosenhayn, NJ 08352 • (856) 825-3700

www.ccia-net.com/solid-waste/

Dispose of medications properly — Take them to an anonymous Rx pill dropbox.

Cumberland County Sheriff's Department
220 North Laurel Street
Bridgeton, NJ

Millville Police Department
18 South High Street
Millville, NJ

State Police Barracks
8861 Highland Street
Port Norris, NJ

Vineland Police Department
111 North 6th Street
Vineland, NJ



BIOLOGICAL WASTE

A large source of water pollution stems from biological wastes, both human and animal, which contaminate the water with bacteria that are harmful to humans and wildlife. Your property could be contributing to this contamination issue in three ways: faulty septic system, animal waste run-off, or an overpopulation of an invasive animal species.

Human Waste

If septic systems are not maintained properly, not only will they contaminate the ground water, they may also contaminate your drinking water source.

To maintain a functioning septic system

- Know where the components of your septic system are.
- Monitor the tank annually.
- Have your septic system serviced every two or three years.

Signs your septic system needs servicing

- Drains and toilet backing up or draining slowly
- Offensive odors either outdoors or indoors
- Grass growing greener or lusher over the drain field than in other areas
- Depressions in the ground on or near the drain field
- Soggy or mushy areas in the drain field

The Cumberland County Health Department has uploaded a miniseries entitled *Septic Essentials* to a YouTube Channel. Just search for **Cumberland County Health Department** on YouTube or follow the link below:

www.youtube.com/playlist?list=PL1na4Qq1jrd1icF7XuEKrpFtSVw_h9S0b



Safe Practices

- Conserve water.
- Replace harsh household chemicals with biodegradable ones.
- Direct all downspout, roof, footing, and basement drainage away from the disposal field.
- Keep heavy vehicles off the system's area.

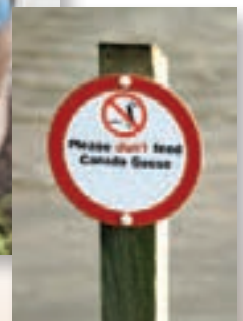
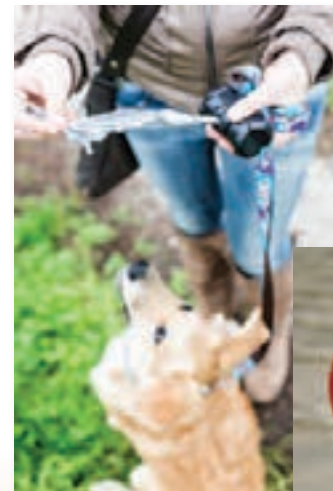
Avoid Potential Problems

- Don't locate deep-rooted plants over your septic system.
- Don't use your toilets or drains as garbage cans.
- Don't pour hazardous household products down drains. Septic systems are not designed to decontaminate.
- Don't use a garbage disposal with a septic tank.

Pet and Other Animal Wastes

Animal feces harbor harmful bacteria that can be transmitted to waterways, other animals, and to humans.

- Be a good *pooper-scooper*! Pet droppings provide breeding places for flies and other insects. Pick up your pet's waste and dispose of it in the garbage or toilet (preferably the garbage). Don't leave pet waste on impermeable surfaces.
- Please do not feed wildlife. Foods other than their natural diet cause illness and deformities, and develop unsafe dependencies on people. Feeding attracts larger numbers causing an unsanitary and unhealthy environment.
- If Canada geese visit your property regularly, plant tall-standing native plants and grasses. Geese don't flock to meadows or areas with tall vegetation.



Go Wild

Gardening for Wildlife



Traditional paradigms concerning man's relationship with nature are shifting away from dominance to a more synergetic connection. A number of local gardeners have joined this movement by asking what they can do to help preserve local environmental integrity on their properties. Many are now promoting biodiversity through wildlife gardening. Essentially, they have started to promote healthy beneficial insect populations by removing exotic plant species and replacing them with **native flora**: those which have existed in an area long enough to have evolved with climate conditions and with other living organisms. These plant species were not introduced to the American Mid-Atlantic region through colonization, importation, or other human activities, but have rather been growing here since the last glacial period. Without both an abundance of native plants and beneficial insect populations, *Down Jersey's* wildlife, small and large, can't prosper. Native flora is the very foundation of the food chain supporting all life forms.

When one link in the chain is compromised, the whole is weakened. Entomologist Dr. Doug Tallamy tells us in his award-winning book *Bringing Nature Home*, "Garden as if life depends on it." Your garden could be the link that strengthens the whole! Just allow it to be a vibrant habitat supporting biodiversity and providing wildlife with a crucial stop-over between preserved areas.

Native-plant wildlife gardens are elegant and provide the whole family with an outdoor area to explore and learn. If you don't believe it, reduce your lawn cover, set up a small bed for native plants, and watch the magic emerge.



Native oak species have the ability to support over 534 species of moth and butterflies.

Dr. Doug Tallamy



Goldenrod is able to support an amazing 115 species of butterflies and moths. This flower is commonly believed to be an allergen, but it is not! The species doesn't reproduce through wind dispersal of its pollen, but rather through insect couriers.

On average, mowing your lawn for one hour produces as much pollution as driving 650 miles.

Per Dr. Tallamy, *Bringing Nature Home*



To create a wildlife-friendly garden, provide three essentials for all life forms:

1. SHELTER

Animals, like humans, also need cover from environmental factors like rain, cold, snow, sun, ice, wind, predators, and the like. By giving them refuge from the elements, they will have places to raise their young and to live out their life cycles.

Brush Piles

Support dragonflies, salamanders, turtles, birds, rabbits, foxes, snakes, insects, and more

- Gather fallen branches, logs and pruning cuttings into a mound.
- Use the largest and heaviest ones for the foundation. Then create layers building from largest to smallest.
- Make sure to build in openings to function as entry points.

Nesting Boxes

For birds, flying squirrels, owls, bats, etc.

- Examine your property's habitat characteristics. Research what type of wildlife would benefit from a shelter there.
- Purchase or construct the appropriate nesting box for the desired species. Poorly constructed shelters can pose serious threats to inhabitants and their offspring.
- Want more guidance? Contact **CU Maurice River!**

Landscaping for Wildlife

All wildlife will benefit from these practices.

- Include a variety of native plants ranging from grasses, ferns, flowers, shrubs, and trees.
- Plant a layered arboretum. While most avian species prefer one story (or layer) to another, they need a diversity of layers to conduct their hunting, foraging, and mating activities.
- When safely possible, leave fallen and decaying trees. Insects, especially decomposers, benefit from them.
- Remember, the fewer bugs you have, the less wildlife will visit your yard.

2. FOOD

Plant native flora that provide beneficial insects and other wildlife with nutrition throughout the year. For more wildlife diversity, make sure your garden has a variety of food sources.*



Protein

Plants that support butterflies and moth caterpillars

Oaks, Willows, Cherries, Birch, Poplar, Crabapple, Blueberry, Maple, Elm, Pines, Hickory, Alder, Ash, Hazelnut, Walnut, American Holly, Beech, Dogwoods, American Witch-Hazel, Serviceberry, Buttonbush, Goldenrods, Milkweeds, Cardinal-Flower, Boneset, Pink Azalea, Spotted Beebalm, Great Blue Lobelia

Nectar

Tuliptree, Pink Azalea, Milkweeds, Cardinal-Flower, Blazing Star, Great Blue Lobelia, Oswego-Tea, Columbine, Beebalm, Spotted Touch-Me-Not, Mistflower, Mountain Mint, Joe-Pye Weed, NY Ironweed, Boneset, New England Aster, Trumpet Honeysuckle, Trumpet-Creeper

Berries & Fruits

Blackberry, Blueberry, Elderberry, Serviceberry, American Holly, Sumac, Bayberry, Red Cedar, Wild Strawberry, Persimmons, Wild Grape, Dogwoods, American Plum, Black Cherry, Chokeberry, Hawthorn, Hackberry, Winterberry, Spicebush, Viburnums, Mulberry, Sassafras, Arrow-Wood, Virginia-Creeper

Nuts & Seeds

Oaks, Hickory, Hazelnut (filbert), Eastern Black Walnut, American Beech, American Basswood, American Pokeweed, Sweet-Gum, American Witch-Hazel, Ash-Leaf Maple, Common Buttonbush, Arrow-Wood, Goldenrods, Milkweeds, Late Purple American-Aster, Common Yarrow, Blackeyed Susan

Cones & Sap

Loblolly Pine, Red Cedar, Northern White Cedar, Pitch Pine, Virginia Pine, White Pine, Eastern Hemlock

* List was compiled with the help of Audubon's Native Plant Database (www.audubon.org/native-plants) and Dr. Doug Tallamy's *Bringing Nature Home*.

A most helpful resource for anyone who is interested in wildlife gardening is Pat Sutton's Garden Gang. Visit her and her husband's website to sign up for the free e-newsletter and see all they have going on.

www.PatandClaySutton.com

© Cyndie Hornblower



CU Maurice River nature enthusiast and program participant enjoy wildlife in a native plant garden.

3. WATER

Where there is water there is life. Clean water is key to wildlife habitats as it provides drinking, bathing and reproduction resources.

Aqua-scaping

Supports turtles, frogs, salamanders, fish, dragonflies, and more

- Create a pond without a liner or a pump by using the water from your gutters and/or the ground water table.
- Ponds should resemble natural ponds in the area.
 - Deep water ponds are more suited to fish needs.
 - Shallow ponds attract waterfowl, varying species of birds, amphibians, and reptiles.
 - For greater biodiversity, provide different water depths by incorporating shelves.
- For frogs, toads, and salamanders dig a vernal pond, a shallow pool that has water in wet months and is dry during the hot months.
- You can create backyard marshes from your roof run-off. Use aquatic plants and place rocks around the edge to provide birds and insects with access to the water.
- Make a container pond. Take a large bowl or basin, put in a layer of soil, plant aquatic plants, and place it in a sunny part of your garden.
- Water Quality
 - Test pond water quality periodically.
 - Keep fertilizers, herbicides, and pesticides away from the area.
 - Grow tall native plants along ponds to deter invasive waterfowl from gathering.



Birdbaths

Provide a place to bathe, escape from the heat, and drink water

- Supply a variety of birdbaths. Some have heaters, aeration, running water, and misters!
- Change the water two to three times a week to avoid supporting mosquitoes.
- Install a group of birdbaths of differing heights and watch the birds bathe and frolic.
- Maintain your birdbath throughout the year. In winter water can be scarce.



Puddling Spots

Butterflies will huddle around puddles to drink water and minerals.

- Fill a shallow container with (unfertilized) soil or sand. Soak the soil, but you don't want a deep layer of water. Add a flat rock or two, where butterflies can rest.
- Place the puddling spot close to nectar plants for best results.
- Keep mosquitoes at bay; clean at least twice a week.
- Replenish water as needed.
- Add the appropriate minerals to provide butterflies with nutrients.



DO NOT PLANT LIST —

The following plants are available for purchase in New Jersey, but are highly invasive, meaning they originate from foreign regions and spread quickly, strangling out native flora and fauna. They can be extremely difficult to control and remove. Don't let your property be overrun by these foreign invaders. Not all species in a family may be native. For example, while there are 600 varieties of oaks, not all are native to the Mid-Atlantic Region. **Only plant the native ones!**

<i>Acer platanoides</i> Norway maple	<i>Lonicera japonica</i> Japanese honeysuckle	<i>Persicaria perfoliata</i> Mile-a-minute vine	<i>Eragrostis curvula</i> Weeping love grass	<i>Pyrus betulifolia</i> Birchleaf pear
<i>Ailanthus altissima</i> Tree of heaven	<i>Lythrum salicaria</i> Purple loosestrife	<i>Cornus kousa</i> Kousa dogwood	<i>Euonymus alatus</i> Winged burning bush	<i>Pyrus calleryana</i> Callery/Bradford pear
<i>Buddleja davidii</i> Butterfly bush	<i>Myriophyllum aquaticum</i> Parrot feather	<i>Poaceae Family</i> Bamboo*	<i>Fallopia japonica</i> Japanese knotweed	<i>Rosa multiflora</i> Multiflora rose
<i>Celastrus orbiculatus</i> Oriental bittersweet	<i>Nasturtium officinale</i> Watercress	<i>Eichhornia crassipes</i> Common water hyacinth	<i>Hedera helix</i> English ivy	<i>Trapa natans</i> European water chestnut
<i>Clematis flammula</i> Fragrant clematis	<i>Perilla frutescens</i> Beefsteak plant	<i>Elaeagnus angustifolia</i> Russian olive	<i>Phragmites australis</i> Common reed	<i>Viburnum lantana</i> Wayfaring tree
<i>Clematis terniflora</i> Japanese clematis	<i>Parthenocissus tricuspidata</i> Boston ivy	<i>Elaeagnus umbellata</i> Autumn olive	<i>Pueraria montana var. lobata</i> Kudzu	<i>Vinca minor</i> Periwinkle*

Extracts from New Jersey Invasive Species Strike Team's 2015 Do Not Plant List. www.njisst.org/documents/DoNotPlantList.pdf

*Bamboo and Periwinkle were added to the list by CU Maurice River.

When purchasing...

1. Cross-check a plant's common name with its scientific (Latin) name. You can start practicing with the list above.
2. Use a plant's scientific name to verify that its native range of distribution is the Mid-Atlantic region.

Get started with these native plant resources:

Newcomb's Wildflower Guide by Lawrence Newcomb and Gordon Morrison
The USDA's Plant Database: www.plants.usda.gov/checklist.html
Lady Bird Johnson's Wildflower Center: www.wildflower.org

Citizens United to Protect the Maurice River and its Tributaries, Inc.

HISTORY

CU Maurice River is South Jersey's leading watershed organization, founded in 1979 and incorporated as a charitable organization in 1986. It was the driving force behind 35 miles of the Maurice River and its tributaries — the Menantico, Manumuskine, and Muskee — being designated as nationally recognized Wild and Scenic Rivers by the National Park Service (NPS) in 1993. CU Maurice River is currently responsible for the stewardship and promotion of the river's outstanding resources, activities that are partially funded through the NPS Partnership Wild and Scenic River program.

CU Maurice River has chosen to work to protect this region for many reasons including its ecological significance, rich cultural history, and economic importance and recreational opportunities.

VOLUNTEER ACTIVITIES

Members and friends of CU Maurice River are involved in a wide variety of projects and activities that further our mission including outdoor education, fieldwork, watershed research, wildlife management, preservation advocacy, and fundraising.

Become a member, make a donation
and/or learn more about us by visiting

www.cumauriceriver.org

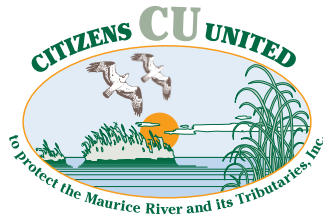


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CU Maurice River is a charitable not-for-profit organization, 501(c)(3)



References: National Parks Service; United States Geological Service; Environmental Protection Agency; National Oceanic Atmospheric Administration; Watershed Institute River Friendly Resident; US Census; State of New Jersey and EPA's Clean Water Book; Bringing Nature Home; Pat Sutton's Garden Gang and various materials; Eric Carlin, Professor, College of New Jersey; NJDEP



*CU Maurice River is dedicated to protecting the watershed of the Maurice River and the region known as **Down Jersey**, enabling current and future generations to enjoy the environmental, recreational, cultural and scenic resources of this Wild and Scenic global treasure. CU Maurice River empowers individuals, organizations and neighboring communities to promote the region's enduring well-being and quality of life. We support education, awareness, and informed decision-making utilizing field work, research, and advocacy.*



This guide was made possible by CU Maurice River with assistance from the National Park Service Partnership Wild and Scenic River Program and The Watershed Institute.



CU Maurice River thanks Century Savings Bank and Kaffé Magnum Opus for recognizing that each of us plays a role in the sustainability of our community. Their sponsorships helped make this stewardship booklet possible. CU Maurice River salutes their forward-thinking corporate values and leadership.

