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NJPB

# New Jersey Outdoors

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# New Jersey Outdoors

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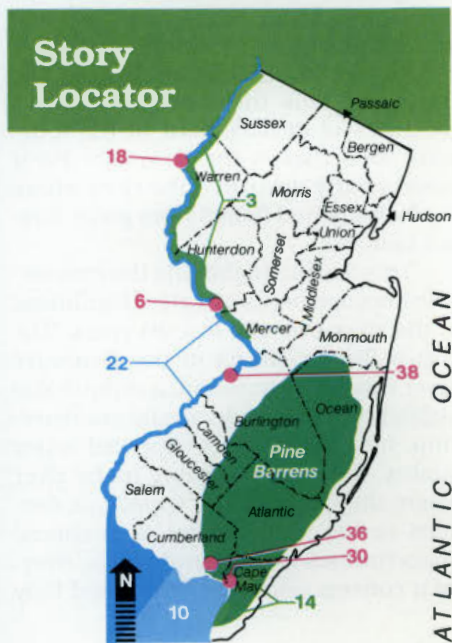
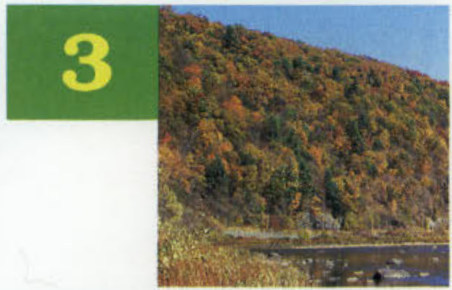
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## Covers . . .

- Front:** Tower on Island Beach. Original watercolor painting by Richard M. Jani. Courtesy of The Richard M. Jani Foundation.
- Inside Front:** The Burlington Island Amusement Park carousel continues to entertain in its current home on the boardwalk at Seaside Heights. Photograph by Robert E. Birdsall.
- Inside Back:** Horseshoe Crab. Original acrylic painting by Carol Decker.
- Back:** Kayakers love to use the white water and rapids at Scudders Falls as a frolicking field. Photograph by Nancy Wolff.

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# Editorial

**New Jersey Outdoors** has devoted the last two summer issues to the Jersey Shore, our 127-mile Atlantic treasure of surf and sand. Following the advice of an American journalist and editor more than a century ago, we depart from that coast and "go west." Explore with us the Garden State's other shore, the Delaware River and its bay.

New Jersey's less traveled shoreline extends 255 miles from our northern border with the Empire State to the mouth of the Delaware Bay. A paradise for anglers, boaters, divers and campers, it offers a myriad of outdoor recreational pursuits along with internationally important commercial activities.

In 1610, an English navigator named the bay after Lord De La Warr, Governor of the Virginia Colony. Portions of what are now Delaware, New Jersey and eastern Pennsylvania were occupied by the Algonquin Indians. Although they called themselves Lenni-Lenape, they became known as the Delaware Indians since the colonists referred to them by the Englishman's name for the river. The Delaware were organized into four divisions, two of which lived in New Jersey: the Unalachtigo in the north and the Kechemache in southern parts of the state. About a century after the arrival of the European settlers, the Lenni-Lenape themselves began to "go west," to Ohio and some as far as Oklahoma.

"Good Faith' Restoration of the Delaware" tells the story of how two centuries of development in the four-state area that is the Delaware River Basin nearly destroyed the river where the Indians had fished from great dug-out canoes.

This feature highlights the remarkable improvements in water cleanliness in the river over the last 20 years. The anti-pollution efforts of the Delaware River Basin Commission, a unique and highly successful federal-state partnership, have resulted in improved water quality, fisheries returning to the river where they were nearly wiped out decades earlier, and greater recreational opportunities both in and on the river. As a consequence, the "grand old lady

of the Delaware Valley" is considered "by many to be the cleanest river along the East Coast."

Join us as we follow the river from Sussex County as it falls 400 feet to sea level in the bay. Journey through the Delaware Water Gap, a two and-a-half mile-long wooded gorge cut by the river in a 1,200-foot high ridge of the Appalachian Mountains; through a national recreation area where you can have as much fun under the Delaware as on top; past fishing hot spots and wing dams; through rapids and white water where kayakers (yes, kayakers) and canoeists frolic in the only major free-flowing river east of the Mississippi. As we go over the falls at Trenton, the river becomes tidal. From there to Artificial Island in Salem County, the 85-mile long estuary is the second most important commercial stretch among American rivers. Only the 2,000-mile long Mississippi is greater.

A well-kept secret is out now, and the Delaware is no longer a forgotten shore on the Garden State peninsula. Estuary studies continue, as do federal and state programs for further improvements in water quality, natural resources or fish and wildlife populations. For new fun, great fishing, exciting river recreation or a journey back in history, "go west" and see the Delaware in any season.

East or west, whichever is your favorite Jersey Shore, get out there and "eNJOy!"



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## New Jersey Outdoors Credo

This publication is dedicated to the wise management and conservation of our natural resources and to the fostering of greater appreciation of the outdoors. The purpose of this publication is to promote proper use and appreciation of our natural, cultural, and recreational resources, and to provide information that will help protect and improve the environment of New Jersey.

Let's protect our earth



NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

# The Big "D"

By J.B. Kasper



*Near Lambertville, the Delaware offered this early April fisherman shad. These line-rippers are returning to the cleaner river in record numbers.*

Photographs by author

## *New Jersey's Longest Fishing Hole*

What starts your heart thumping? The thrill of a silver-sided shad peeling line through the cool, clear waters of spring? A bronze-colored smallmouth leaping skyward as it engulfs a surface plug on a shallow flat? Maybe it's the telltale thump of a night-feeding walleye on a desolate stretch of river amid the cool autumn air!

If any or all of these tales sound too good, especially since the excitement can be found only a short distance from the most populated mecca in the East, then you haven't paid a visit to the Big "D" lately.

The grand old lady of the Delaware Valley is in better shape than ever before. Considered by many to be the cleanest river along the East Coast, she supports the largest variety of fisheries found anywhere in New Jersey. She provides anglers with year-round fishing for

smallmouth, walleye, muskie, largemouth, channel catfish and a multitude of panfish. She also sports seasonal populations of shad and herring and an exploding striper fishery. Where else can you find a smorgasbord of so many angling treats to tempt your skills?

Rescued from the near fatal blow of pollution and misuse during the years preceding the Second World War, she has rebounded into an angler's paradise with scenic settings that rival less populated sections of our great land.

During winter, when the average angler finds more comfort next to the hearth with a favorite fishing show, the serious angler or fishing fanatic willing to brave the elements can still find action. It's during this time that one of the river's largest inhabitants, the Tiger muskie, prowls the drop-offs, deep holes, warm-water industrial discharges and mouths of small streams, preying on suckers and other fish that do not become semi-dormant.

The New Jersey state record Tiger muskie was caught during winter, only a few miles north of Trenton. Many trophy fish are taken from the river during the colder months. Even though the best fishing for tigers is during these cooler times in late autumn, winter and early spring, muskies still can be taken during warmer weather and are considered year-round gamefish.

With the advent of spring, two bottom feeders begin to make their presence increasingly felt. The walleye and the sucker are often found together in the eddies located below bridge piers, islands and points of land, as well as in the mouths of the many small streams that feed into the river. Some of the hardest fish in terms of water temperature that inhabit the river, they are active when most other fish become semi-dormant.

The main difference between these two bottom feeders is the walleye's nocturnal feeding habits, even during the cooler part of the year. As a result, numerous fires can be seen along the river during early spring and late fall as seasoned walleye fishermen seek their quarry.

Some of the better known walleye spots on the river are the Water Gap, Poxono Island, the wing dams at Scudders Falls, Lambertville and Bull's Island, Wallpack Bend and Raubs Island.

Old "Hog Lips" can be found during early spring in the waters of small streams entering the river. Being one of the first fish to spawn, walleyes move into these areas when the spawning urge takes over, starting as early as late February.

The fishery that stirs the greatest interest of any in the river is shad. Often dubbed the poor man's salmon, their numbers have been

on the increase for the last 20 years. Although the pollution block in the Philadelphia/Camden area and elsewhere along the river all but extinguished shad migration in the 1950s, enforcement of more stringent anti-pollution laws and an overall cleaning up of the river have brought this line-ripper back in record numbers. So much so, Delaware shad have become a sort of breeding stock and have been transported to other rivers in hopes of starting runs in them.

The heart of the shad run starts in the non-tidal river above Trenton during late March and early April. It moves further up river as spring progresses and the fish head for their maternal spawning grounds. These fish range in size from two to three pounds for the male or buck shad and can run up to 11 pounds for the larger female or roe shad.

Some of the top spots legendary among the shad fishing clan are Scudders Falls, Lambertville, Bull's Island, Point Pleasant Eddy, Stant's Eddy, the Portland Power Plant, Delaware Water Gap, Wallpack Bend and Dingman's Ferry. Many communities along the river sponsor shad festivals and contests, and fishermen often jam the launch ramps well before daylight in an effort to test their skill against these powerful adversaries.

Of all the fish the river offers, the smallmouth bass is probably the most plentiful. Pound for pound, ounce for ounce, it out-fights any fish and is well suited to life in the currents and eddies that haunt the river. Although it does not compare in size with the walleye, muskie or shad, the smallmouth makes up for it in tenacity and numbers. Acrobatic prowess is its trademark.

From Trenton north the Delaware is a rocky



A freshwater fishing instructor and field editor for *The Fisherman* magazine, **J.B. Kasper** has penned articles for NJO and numerous outdoors magazines. Joe also provides guide services for Delaware River fishing trips.

bottomed, free-flowing body where water temperatures can reach the high 80s during mid-summer. These high water temperatures and the rich oxygen levels, supplied by the many rapids found on the river, cause the smallmouth and panfish populations to feed constantly.

Excellent surface action can be found on just about any flat in the river during early morning and late evening. Once the sun has made its appearance, the angler can take abundant catches of smallies on plugs and rubberbaits from the numerous eddies.

When it comes to panfish, the Delaware takes a back seat to no river. With ample populations of sunfish, bluegills, perch, carp and catfish, the freshwater angler has no problem putting a bend in his rod. One of the prime times to fish for jumbo bluegills and pumpkin seed sunfish, many weighing a pound or better, is during late May and early June when the inchworms are falling off trees and these panfish are spawning. They make easy targets for the angler with ultralight tackle or fly rod and jig and small plastic bait combinations or flies.

If catfish or carp are to your liking, wait for a storm to pass through the area and muddy the small streams that flow into the river. The turbid water from the stream merging with the clear water of the river produces a cloudy water break-line. Catfish, along with other fish, lay along the color line picking up the forage washed in from the stream. A can of worms or some dough bait will enable you to fill your stringer in a few hours.


The real fishing bonanza occurs during autumn when small shad and herring make their way down the river. This signals the start

of the fall feed, when most fish will rampage through these schools of small fish to fatten up for the approaching cold water season. It's not uncommon to catch several species of fish mixed together while they are on a feeding binge. This exciting fishing often lasts well into November. With a mild autumn, good numbers of smallmouth, walleye and panfish can be taken in December.

During the fall feed, live bait will be the angler's most productive choice. Minnows and hellgrammites will take the majority of the smallmouth and panfish, while night crawlers and leeches fished with bottom-walking rigs or used as dressings on a jig will put you into the walleyes.

Over twenty public boat launch sites on both sides of the river from Trenton to Dingman's Ferry give the boat fishermen access to the river. Ample access is also available to the shoreline fisherman and wader. During summer, wading and canoeing offer two of the more pleasant methods to fish the river.

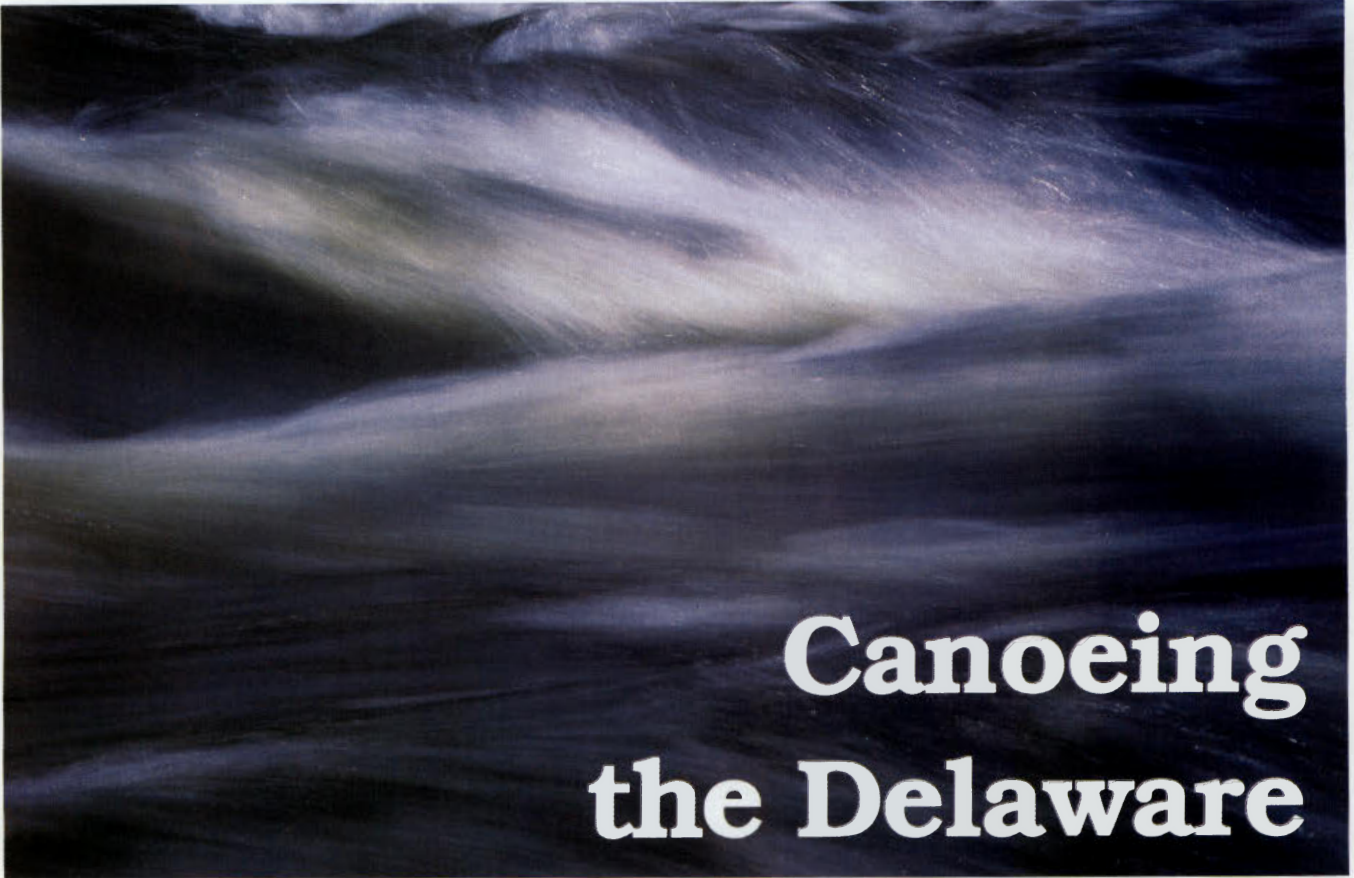
The DEP Division of Parks and Forestry operates two good-sized camp sites, one at Bull's Island and the other at Worthington State Forest. Available on a first-come, first-serve basis, they make an excellent base for the fisherman who wants to spend a few days on the river.

If you have never visited the Big "D" and fished her waters from Trenton to the New York state line, you don't know what you're missing. Excellent water quality and pristine settings help you forget just how close you are to modern civilization and millions of people. Once you've tasted what the Big D's waters have to offer, New Jersey's longest fishing hole will induce you to return again and again. 

*(facing page) Using a shad dart along the non-tidal stretch above the falls at Trenton, this angler prepares to match skills with one of the river's most notable fish.*

*Due to low flow in late summer and early autumn, rock-bottomed shallow flats in the Delaware Water Gap National Recreation Area are ideal for live lining.*





# Canoeing the Delaware

White water at Scudders Falls.

## Just Follow the Feathers

By Nancy Wolff

"Draw! Draw!" The shouted words whipped across the air. I gritted my teeth and *drew*. The canoe instantly responded. Just in time, we avoided a treacherous rock off to the left.

Everything was happening too fast. Pillows of smooth water hid dangerous rocks. I wasn't sure about the tom-toms. Eventually they registered as my own heartbeat up in my temples.

Suddenly all was quiet. The canoe had reached an eddy—a still pool with no downstream pull. My stern partner (his location, not his temperament) said, "Great run! Shall we portage upriver and do it again?"

Whoosh. I let my breathing regain its normal pace, turned around, and made a face at my partner. "Drag this boat upriver? You've got to be kidding! I'm exhausted! Don't they have upstream ski lifts here?"

Paddling in the stern of the canoe in which I paddled bow, Corny just laughed. We negotiated, and I won. We sat back and ate our lunch before moving back upriver and running downstream again. We watched the other canoeists, Appalachian Mountain Club (AMC) members on a Class One whitewater instruction weekend. Some were shooting the rapids near the Lambertville wing dam on the Delaware River. Others near the bank were receiving initial instruction or corrective tips from experienced paddlers.

The quiet after lunch was broken by, "Who's going back up?"

"Everybody! Get going, gang! We can run this section a few more times before takeout!"

Good-natured moaning and groaning accompanied the upstream maneuver. "What am I doing here?" seemed to be the main theme.

What were we doing there? A dozen or more valiant souls on a hot July day, wearing life jackets in the searing sun, fighting the river for control of an open Grumman aluminum canoe, then lifting one end of the boat (your trusty partner lifting the other end or, better yet, four of us hefting one boat in teams) and carrying it while walking back upriver to do it all over again.

We were Appies—members of the AMC's New York Chapter (now called the New York-North Jersey Chapter)—learning whitewater canoeing. Most of us already had been on several "brown-water" streams in south Jersey's Pine Barrens and had learned basic paddling strokes: the J-, C-, draw, sweep, pry, cross-draw, forward and back strokes. We were happy with the AMC's emphasis on safety.

"That life jacket is for saving your life, not for a kneeling bench! Wear it!" bellowed one forceful instructor.

"Kneel! Get down! Don't ever stand like that! You'll tip yourself and your partner! Get DOWN!" foghorned another.

Volunteers all, our canoe instructors either bellowed—there's no other way to describe it—at top volume (the better to be heard over the roar of the rapids and the screams for rescue) or they spoke softly (the better to get your complete attention).

Corny, my paddling partner that July morning, was a soft speaker. "Now," he'd say, "let's not work against the river on this run. Just follow the feathers and they'll take you downstream." I looked up at the turkey vultures soaring overhead, waiting for us to make a wrong move.

"No, not those feathers. Thoreau wrote about the feathers of the river," Corny patiently explained. "The small tongues of water that

lead you between the rocks, the smoothest way."

Corny explained his creed to me. "The river is stronger than I am. Therefore, I don't try to defy it. The river is my source of power. I don't try to move or maneuver my canoe with my own strength. I use the strength of the current."

While others bashed the rapids, Corny was teaching me to read the water so I could guide the bow, my end, safely between several threatening choices. It works for fields other than canoeing, too. "Just follow the feathers."

We were undergoing this Class One whitewater instruction so we could practice basic techniques under the watchful eyes and helpful direction of expert volunteer tutors.

"One canoeist, starting an upstream ferry out of an eddy, entered the current at too great an angle and was carried broadside downstream for some distance. He barely avoided being swept into a bouldery falls just below. Had he practiced this maneuver where there was no penalty, the technique would have been at hand when needed."

*White Water Handbook*, 2nd Ed., by John T. Urban. Revised by T. Wally Williams III. Boston: 1981.

*Canoeists camp on serene islands in the river. This one is near Milford.*



J.B. Kasper

Our teachers firmly agreed with Williams' understated directive. We practiced and refined and worked out all possible variations in our strokes. The wing dam provided just enough rapids to give us a short challenge and a quick recovery. We'd get critiqued, then go up and do it again—better. And again. And again.

When they weren't instructing novices, the instructors took their own covered boats out into the heavy rock-strewn rapids across the river and cavorted among the waves. They did Eskimo rolls, ferried around the boulders, rode the standing waves and roared with joy. They yelled like walruses, as they wriggled and writhed in their boats like so many slippery otters.

We were ready for the Delaware only after passing several preliminaries. Brown-water experience observed by an expert paddler was most important. We had to demonstrate basic ability in both the bow and the stern.

We registered for brown-water trips in the Pine Barrens rivers: the Toms, Great Egg, Crosswicks Creek, Wading and Batsto. Classic trips, and in those days not too crowded. Those really *were* the days.

In AMC listings, the Delaware is primarily a Class One river. True, there are some Class Two rapids, and in extreme high-water seasons certain parts of the river may be AMC-

*The Delaware's white water and rapids give way to more tranquil moments.*



Patrick Sarver

rated Class Four until the water returns to normal levels. The Delaware is wide. And long.

And beautiful. We've seen bald eagles perched in nearby treetops. Eastern banded kingfishers swoop and dive, catching tiny fish for their young. White-tailed deer tiptoe cautiously to the banks in the early morning or late afternoon, look right and left, lower their heads, and sip delicately from the Delaware. Alert to a movement on the opposite bank, their heads come up, their entire bodies stiffen, and they bound away over the rocks to safety in the woods.

The banks of the Delaware are muddy, silty some say from the rich farmland upstate. People swim in the water, and sail, and raft, and tube and fish. And, of course, canoe.

When all these activities are centered in one location, the resource becomes overused. Scudders Falls, for example, is a popular whitewater spot. Located near campsite and canoe rental businesses, as well as a public boat-launching site, Scudders Falls becomes Coney Island in July. A carnival-on-water atmosphere prevails with crowds of people in inner tubes lashed together, wielding beer cans, wearing bikinis and shouting obscenities at one another over the roar of the rapids. Youngsters clutch canoe paddles like baseball bats, fanning the water with combinations of panic, determination and glee, luckily surviving the run over rocky beds. Hordes of canoe-rental parties with coolers throw one another out of the canoes into the water. This is wilderness? Guess I'm getting too old to enjoy the river.

After paddling all day—and it's hard work to do it *right*—what a glory it is to sit around a campfire swapping jokes, canoe stories and songs. We insisted that Corny sing "Seven old ladies locked in a lavatory" every time. Or we'd request another favorite from our guitar-playing songmistress Helen.

*We never mention Aunt Clara;  
Her picture is turned to the wall.  
Though she lives on the French  
Riviera,  
Mother says she is dead to us all.*

After our first day of canoe instruction on the Delaware, we drove away from the river and turned at one of those beautiful old stone farmhouses, up a narrow country lane past the house, up through the fields, along a stone wall in a pasture backed by the woods to camp overnight. We dug a pit for the fire.

Nowadays, campfires are taboo in the AMC. Public campsites have been scoured of appropriate firewood. There just aren't sufficient

quantities of wood for every party to have its own fire. In our state parks you now are advised to bring firewood with you.

Next day it was back to canoe instruction on the river. Paddling with different partners, we learned in the bow to "read" the river and to call out to our partner in the stern when (and where) we saw a rock, branch, or other danger. Then we'd do a corrective stroke—a draw or a pry—and our stern would follow suit.

Legend has it that many marriages and potential relationships are broken up forever when partners paddle together. After paddling bow to Corny's stern, I'd get into another boat with my husband in the stern and blame him if the boat didn't move the way it did when Corny, rated Class Four, or Henry or Mary sterned. On the other hand, having recently paddled with Louise or Helen Marie or Lee or some other Appie expert, he wondered why the bow under my "command" wasn't doing what he expected bows to do. Like teaching one's spouse to drive, paddling together is not recommended for longevity in a relationship. And don't talk to me about communication.

After we had paddled several times through the white water at the wing dam, we had a treat on that hot July day. Wearing a trusty life jacket over our paddling clothes, we walked out into the river, got on our backs, and floated downstream through the rapids for more safety instruction.

"Keep your feet on the surface! Keep your head upstream and your feet downstream! Use your arms to guide your body away from that pillow—there's a rock hiding underneath!"

Of course, we couldn't hear these shouted directions because of the overwhelming rush of water around our heads and the exhilaration—or maybe panic, or perhaps intense concentration—connected with the actual run. But we'd been primed for this through previous instruction, and we knew those commands were being sent our way.

After a few minutes (hours?), the river thrust us out into an eddy. We recovered, gasping for breath and looking around for compliments. We survived! But no—we could have done better. After all, this training was a practice for our survival if a canoe overturned, dumping us in the river.

A standard 16-foot aluminum Grumman canoe weighs about 70 pounds empty. It surely seems like more at the end of a long day's paddle when we carry the canoes up the riverbank to the car or canoe trailer and L-I-F-T them up to secure them in place for the ride home. Even with three others helping, it's no picnic.


In a river moving at 5 mph, that same 16-foot canoe has a hydraulic force of 2,240 pounds, according to the American Red Cross. It's not pleasant to think of your canoe as a potential weapon, but if you dump mid-river you might get bonked on your head. Canoes full of water don't just sink like a stone to the bottom of a fast-moving river. They sometimes hurl end over end downstream. "MOVE AWAY FROM THAT BOAT! DO YOU WANT TO GET DRAGGED UP AGAINST A TREE AND HAVE A LEG AMPUTATED? GET AWAY FROM THAT BOAT!"

The lessons learned from those dedicated teachers are with me still. What a great time it was. What hard work it was. After a while we heard ourselves saying to a novice, "Hold your paddle like this. No—*this* is a pry. That's a drawstroke. Try it this way." Or, "Hey! *Don't stand up in that boat!*"

Another phase of our learning was a crack at paddling in a covered boat. Many AMCs own their own C-1s, C-2s or kayaks (simply speaking, the differences are primarily in how one sits or kneels and maneuvers the craft). Some were willing to share that knowledge, too. Most of these boats had been made by their owners. Working weekends had enabled people to share the construction time and effort.

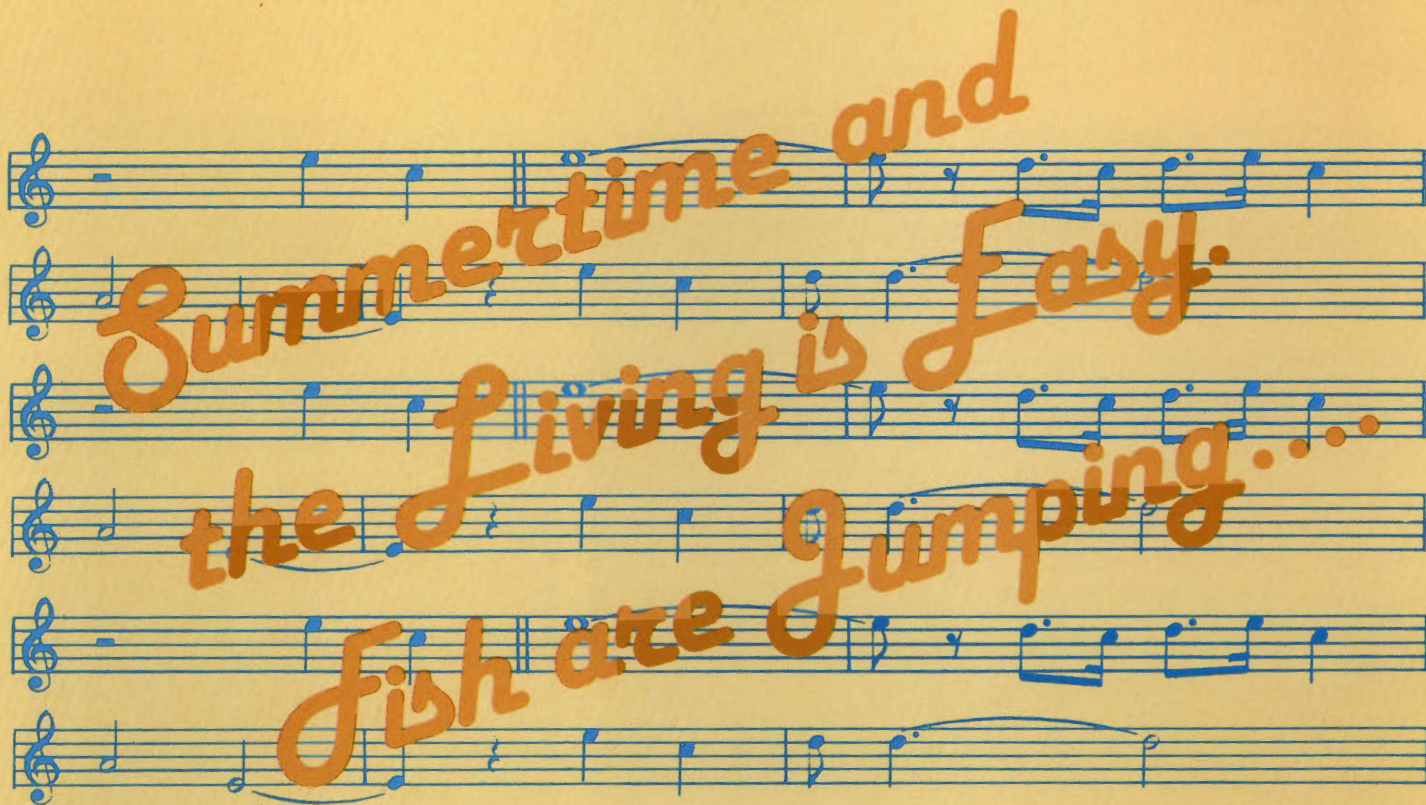
Knowing that Helen Marie had made her own C-2, I approached it with some trepidation. "It's not as fragile as it looks," she reassured me. Kneeling with my legs braced firmly at the sides by nylon webbing (sort of like seat belts for the knees) was a position I knew I would not be able to maintain for long. But what a difference in maneuverability! I felt as if I were a chicken riding its own eggshell. It was fun, and it was interesting—but it wasn't for me. Helen Marie's help got me through the initial stages, but the vision of me doing an Eskimo roll down the Delaware tended to break my concentration.

That July weekend 20 years ago—after we'd worked and swum and eaten and sung and cleaned up and paddled and paddled and paddled some more—was finally over. We hauled those boats out of the river toward the cars. Still wearing our life jackets and the spray skirts from the covered boat session, we laughed at each other. "You look like some creature from outer space," we jeered.

Then someone else spoke up. "Speaking of outer space, I just heard on my car radio. We've landed on the moon. The USA has put a man on the moon!" It was the perfect ending to a far-out weekend. 

**Nancy Wolff** made her NJO debut with last fall's Union County Hiking Club feature. Having dumped last spring during flood stage in a Class Two river with ice still on the banks, this Montclair resident may be less enthusiastic now about river canoeing than when she first paddled the Delaware.





By Brion Babbitt

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**Summer fishing along Cape May County's "other" shore is a light-tackle paradise for saltwater anglers seeking plenty of fluke and weakfish.**

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Living in New Jersey's southernmost county has definite advantages for the saltwater angler. Sometimes it's difficult deciding whether to sample the outstanding action along Jersey's Atlantic coast or the unique, in-shore sport available in Delaware Bay. When the heat of summer is in full swing, that decision becomes just a little bit easier, at least for me.

Obviously, you do not have to be a Cape May County resident to enjoy the fine, light-tackle fishing that occurs each summer in Delaware Bay, as thousands of visiting anglers have discovered. Best of all, most of the sport is very close to the Garden State's shoreline that rims the eastern expanse of Delaware Bay.

Summer-variety weakfish ranging from one and-a-half to four pounds and fluke (summer flounder) up to five pounds are perennial, hot-weather visitors to the bay. These bottom-hugging denizens satisfy the light-tackle cravings of thousands of private boaters and patrons of party and charter boats that sail from For-

tescue, Wildwood and Cape May ports.

In fact, near-shore weakfishing occurs throughout the summer months right into mid-October, reaching along the bayshore from Cape May through Cumberland and northward to Salem County. Why tight-schooled weakfish push in so close to the shore that they can be caught by surf fishing at Fortescue is anyone's guess.

One good reason may be the incredibly healthy supply of forage present in Delaware Bay the past several seasons. Rafts of killifish, spearing, menhaden and spot literally boil in the tributaries emptying into this large body of water throughout the summer. Shoals of nervous baitfish can also be spotted languishing along the shore, servants only of the tide. It may be simple logic that hungry predators on the prowl, such as fluke and weakfish, know a good thing when they see it. In any event, the gamefish are there and cooperative. Anyone willing to surf-fish, patronize a rental-boat livery, trailer their own boat, or hop a party or charter boat can cash in quickly on the fast-paced sport.

Summer light-tackle fishing for fluke and weakfish is just that: a six to six and-a-half-foot spinning or conventional rod rated for line testing to 12 pounds is perfect. You could go lighter on line test or rod length and strength, but you will need a minimum amount of strength in your fishing system to handle sinker weights up to two ounces. A six-

*Camouflaged well, this fluke waits to ambush an unsuspecting meal.*



*(left) Along the other Jersey shore, fluke fishing begins in July and gets better in the bay well into October.*

*(right) Summer-variety weakfish are plentiful in the bay, where large schools often move very close to shore.*

pound test outfit theoretically could be used on these fish, but the accompanying wispy rod may lack sufficient backbone for some hook-setting chores.

Delaware Bay tidal currents can run heavy. The need for more bottom weight or added tip and butt strength in setting up and playing a four-pound weakfish or flounder in strong currents could be beyond the ability of ultralight gear. Going light is great sport, but nobody likes losing fish—especially the largest ones of the day!

What I like most about a Delaware Bay summer outing is that you really don't know whether your offering will be inhaled by a fluke or a weakfish. Tactics for taking the two overlap substantially, and this adds to the fun. The two most-favored approaches are bottom-fishing with cut bait and bottom-fishing with lead bucktails tipped with bait. Both techniques work, although I suspect more practitioners prefer just bait over a combination of bucktail and bait. Delaware anglers have had outstanding results using both over the years, from one end of the bay to the other.

Rigging for summer bait-fishing is easy. Take a 30-inch length of clear, nylon leader material and tie on a #7 barrel swivel at one end. Tie a loop at the other end using a perfection-loop knot. At equal intervals along the leader, tie in two dropper loops using the surgeon's knot or other loop knot. Using two, 12-inch snelled leaders each with a #2 hook, add them to the main leader line by interlocking



the loops. Variations on this tandem, high-low bottom rig are endless. You may decide to tie on a big sinker snap at the end of the leader instead of a loop.

Hook choices among seasoned bay veterans also vary. Hook patterns effective on fluke and weaks include the standard O'Shaughnessy hook, the barb-shanked, bait-holder hook, curved-point or beak hooks, English-style, wide-gap hooks and long-shank Carlisle patterns. Some experienced bay weakfishermen even swear by gold-finished hook patterns in attracting summer "trout" when duller finishes produce fewer strikes. All the designs work. The pattern you choose will depend on your preferences and personal experiences culled in fishing.

Some anglers believe that simple is beautiful and merely fish one hook. You can do this by building your bottom rig around a #4 three-way swivel. Tie your spool line to one eyelet, loop in a snelled leader to another and add a sinker snap or short length of monofilament to the third eyelet for attaching the sinker.

When the summer-run weakfish begin to enter Delaware Bay in July, they are often easily spooked. The trick in catching these fish is unusually long leaders that place the hooked offering well away from other terminal tackle such as sinkers, swivels and heavy connections. Under these conditions a leader of up to 36 inches may be required. Years ago

when summer weakfishing wasn't nearly as good as it is now, it was mandatory to rig long because any leader shyness merely compounded the problem of fewer fish. The other important factor in catching July fish is using cut shedder crab for bait.

Regardless of whether you choose the tandem or single-hook approach, you can catch fluke or weakfish interchangeably with these bottom rigs. Under most wind and current conditions, a two-ounce sinker will keep the rig in contact with bottom. Use no more lead than is necessary to maintain your bait close to the bay floor; this will pay dividends in increased sensitivity. Fluke, even the larger specimens, and weakfish can be tentative in striking. When this happens, being able to "feel" the attack is important, and doing so naturally will result in a larger percentage of hook-ups.

Anglers who enjoy bucktail-fishing can catch fluke and weakfish on leadheads that range from a mere three-eighth ounce (slower current conditions) up to a full ounce under fast-tide conditions or when the wind causes boat drift. The most popular leadhead colors are white and yellow.

You can enhance greatly the effectiveness of the bucktail jig by adding a pennant-shaped strip of squid three-inches long for enticing flatfish or weaks. A killifish hooked through both lips works well when fluke are the desired quarry. Naturally the minnow, though very effective, is less durable and will not withstand as much casting about as the squid strip.

You can expect fewer hits on jig sizes larger than one-half ounce simply because many of the weakfish caught will be in the smaller, one and-a-half to two-pound class. Because buck-tailing can require less overall weight, you have a shot at some even lighter, light-tackle angling with the bay's small denizens.

Under the proper sea and wind conditions, lines may test only from six to eight pounds and still allow the angler to manage both lure and hooked quarry. Though most of the Delaware Bay gamesters prefer to feed on a moving tide (either ebb or flow), weakfish can be caught on slack water. Under these still-water conditions you can take them on the lightest of lures and discover the added enjoyment of casting very light bucktails to cooperative weakfish.

In probing the waters of Delaware Bay for summer flounder the best approach is drift-fishing. This allows more of the bay's productive grounds to be covered and also presents your offering precisely as these predators prefer it—moving.

Fluke are voracious feeders. They lie in wait

on the sea floor, their backs intricately camouflaged, allowing them to blend in perfectly with the surrounding bottom. When a likely morsel happens by, they promptly ambush it. Anyone who has examined closely the mouth of a fluke quickly arrives at the conclusion that they are well equipped for such a task. Bay fluke once hooked will not pull you in, but they will put up a spirited, surprising battle on light tackle.


Though most summer weakfish in Delaware Bay rarely exceed four pounds, these fish are scrappy fighters. They will thrash, dive and put on a last-minute spurt of energy to avoid the net. Make no mistake about it—a net is mandatory for these tender-mouthed creatures. Though no softy on the strike, these fish have delicate mouth tissues which quickly tear away from the hook should the angler mistakenly decide to swing them into the boat rather than net them.

Unlike fluking, weakfish can be readily caught "still-fishing" at anchor, or "on the hook" as many bay captains prefer to call it. It can be tricky in positioning the boat, but once a large pod of hungry weakfish has been located it is possible to anchor and enjoy unabated, end-to-end action.

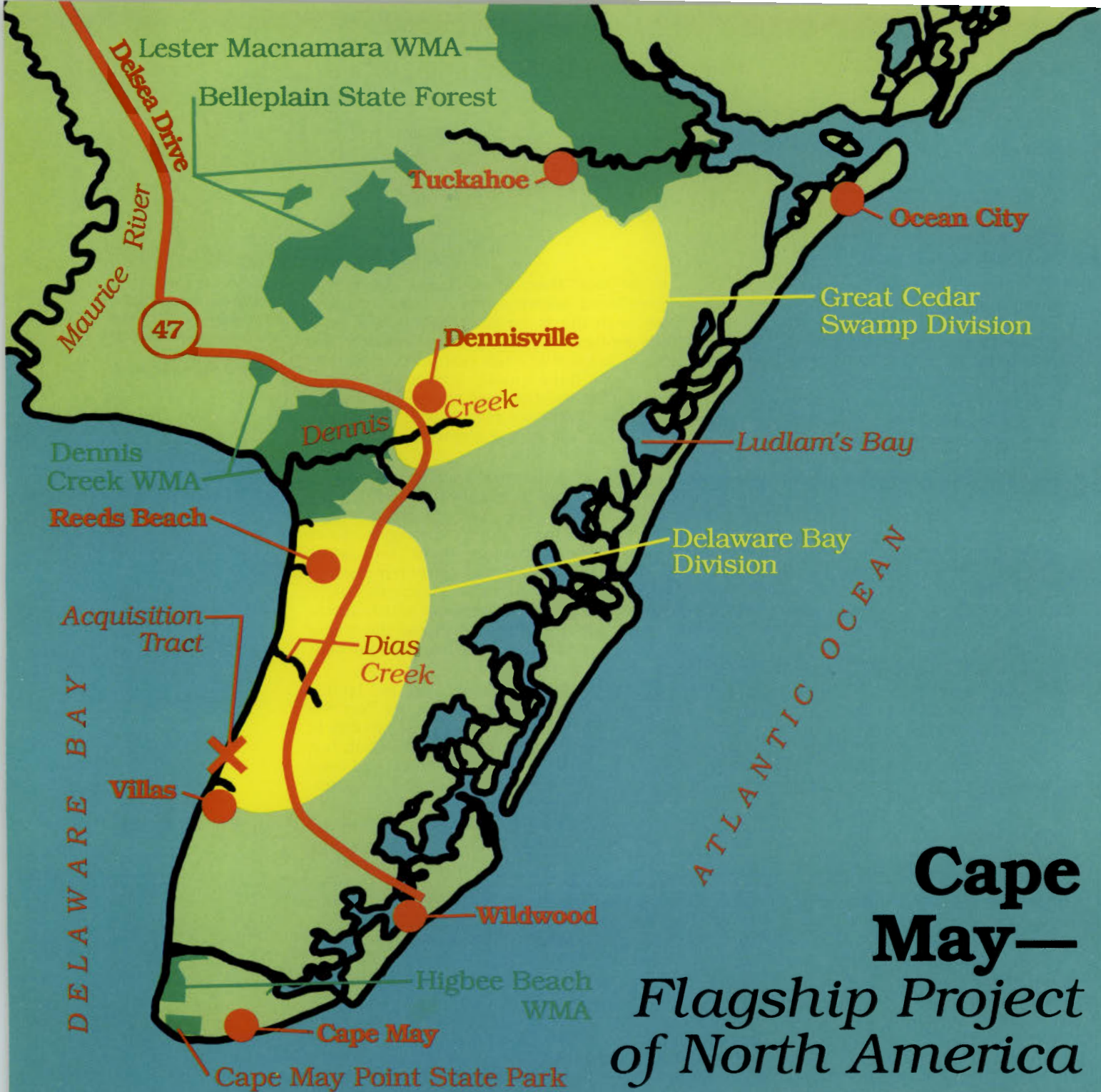
Many times it seems that no sooner has the anchor been slipped over the side than the boat settles mispositioned or the school of fish decides to move elsewhere. It often requires careful, deft maneuvering by the skipper, but anchoring for weakfish can out-produce drift-fishing, especially if locating the little critters happens to be difficult on a given day.

Locating fluke, and especially weakfish, is not an overwhelming task in Delaware Bay because flotillas of boats on the horizon pinpoint the action. Large numbers of boats at anchor generally indicate that a sizeable body of trout is below and has not shown any indication of vacating the immediate area. This often happens in the latter part of summer when the weakfish move extremely close to shore, spread out over relatively large areas.

Perennially good spots to search for fluke and weakfish off the Cape May County shoreline include Sixty Foot Slough, Bayshore Channel and around Bug Light, Maurice River Cove and the Egg Island Flats area off Cumberland County are noteworthy Delaware Bay anchorings.

Summer fluke and weakfishing in the bay gets better and better throughout the summer. As if that isn't enough, the sport continues past Labor Day and extends well into October. Then New Jersey anglers are given more opportunity to enjoy some of the best fishing Delaware Bay has to offer. 

Cape May County sportsman **Brion Babbitt** authored several 1988 articles on tiderunners in Delaware Bay and sportfishing for sharks.



# Cape May— Flagship Project of North America

By Tony Petrongolo

**“The Cape May Peninsula is one of southern New Jersey’s greatest natural treasures. It’s important for all of us to work together to preserve the rural character of this region and protect its natural resources now, before it’s too late.”**

With these words U.S. Congressman William J. Hughes keynoted the May 13, 1989, dedication of New Jersey’s newest National Wildlife Refuge. During the Middle Township bayside ceremony, the deed for the first 90 acres of the proposed 15,000-acre tract was symbolically transferred from the New Jersey Chapter of the Nature Conservancy to the U.S. Fish and Wildlife Service. The Nature Conservancy had recently purchased the bayfront property from Modern Builders and Drywall.

The Cape May Peninsula has long been renowned for its spectacular concentrations of migrating birds during fall. Because of its

unique physiographic location on the Atlantic seaboard, the Cape May Peninsula concentrates thousands of birds of prey, songbirds, waterfowl and woodcock that linger while waiting for favorable wind conditions to cross the 12-mile expanse of Delaware Bay.

In addition to its world-famous prominence as a concentration area for these fall migrants, this area has been shown to be critical habitat for the declining black duck and a number of shorebird species. New Jersey's Delaware Bay marshes provide wintering habitat for 34 percent of the Atlantic Flyway black duck population. The Cape May wetland and wetland-edge habitats to be protected by the refuge provide some of the state's best, and most threatened, black duck wintering habitat.

The shoreline of Delaware Bay is now recognized as the second largest migratory staging area for shorebirds in North America, second only to Alaska's Cooper River Delta. Over a million shorebirds stop at the Jersey Cape each year on their way from wintering areas in South America to Arctic breeding grounds. In 1985 the Delaware Bay was designated by New Jersey and Delaware as the first "Sister Reserve" in a network of international shorebird reserves proposed by the International Association of Fish and Wildlife Agencies and the World Wildlife Fund.

Major portions of the global populations of four species of shorebirds (red knot, ruddy turnstone, sanderling and semipalmated sandpiper) congregate on the Delaware bayshore each spring to "refuel" during their 6,000-mile transcontinental migrations. For these species, the cape habitat may be irreplaceable. The refuge area contains breeding habitat for several of New Jersey's endangered (E) and threatened (T) species, including the red-shouldered hawk (T), barred owl (T), Eastern tiger salamander (E) and Southern gray treefrog (E). This area is also important to wintering populations of owls, where the thick cedar groves and woodlands provide habitat for long-eared, short-eared, saw-whet and barred owls. Fox, mink, ruffed grouse and river otter also inhabit the refuge area.

In 1972, the U.S. Fish and Wildlife Service had proposed that a National Wildlife Refuge be established at the lower end of the Jersey Cape. This proposal never came to fruition, although a portion of the site was purchased by the state in 1978 to become the 400-acre Higbee Beach Wildlife Management Area.

Much of the remainder of the proposed refuge site has since been lost to development. The population of Cape May County increased 56 percent from 1970 to 1986, and this rapid growth continues at an ever-increasing rate. The 1,180 building permits issued in 1986 for



Breck P. Kent



New Jersey Outdoors

(top) On Delaware Bay beaches, hundreds of thousands of horseshoe crabs spawn annually.

(left) Helen Fenske, DEP Assistant Commissioner, Director George Howard, Fish, Game and Wildlife, and Bruce Runnels, Nature Conservancy New Jersey Chapter Director, listen to Commissioner Christopher Daggett's dedication remarks.



New Jersey Outdoors

*Wildlife and estuarine marsh habitat, similar to this along the Dias Creek, will be protected in the refuge.*

new single-family homes were nearly triple the number issued only four years earlier.

During the next decade, it seems likely that much of the remaining upland and wetland-edge wildlife habitat will be lost to further development. It was with a sense of urgency, when the DEP Division of Fish, Game and Wildlife proposed in October 1987 that one of the last large blocks of undeveloped habitat in this traditional concentration area for migratory birds be protected.

The Cape May National Wildlife Refuge, as proposed, would encompass approximately

15,000 acres in two units. The 7,000-acre Delaware Bay Division would extend along the Delaware Bayshore for approximately five miles, from the Dennis Creek Wildlife Management Area near Goshen to Cape May County's Fishing Creek Conservation Area in the Villas.

Habitat in this unit is approximately one-third each of estuarine marshes, freshwater wetlands and upland. It includes the headwaters of three creeks—Dias, Bidwell's and Green—and extensive areas of marsh fringe, a habitat type particularly important to black ducks in winter and to raptors and woodcock during migration.

Public acquisition of the Green Creek marshes provides an excellent opportunity to improve fish and wildlife habitat. These marshes were diked years ago in a futile attempt to control mosquitoes. Breaching these dikes under a wildlife management program will return tidal flow to the area, reestablish *Spartina* as the dominant species of marsh vegetation, restore the area's former productivity and improve habitat for fish, shellfish, waterfowl, shorebirds, raptors and many other forms of wildlife.

The 8,000-acre Great Cedar Swamp Division in northern Cape May County forms the headwaters of Dennis Creek and Cedar Swamp Creek. It would connect the existing Lester G. Macnamara and Dennis Creek wildlife management areas. Located in Dennis and Upper townships, it is approximately 80 percent freshwater wetlands, with the remainder upland edges of these wetlands. Large, undisturbed stands of Atlantic white cedar are found within "the swamp," along with exceptionally large old growth oak, black gum, sweetgum, red maple, swamp magnolia and American holly. It harbors significant numbers of the rare swamp pink, a federally-designated threatened plant species rapidly disappearing in the state. New Jersey accounts for about two-thirds of the known world populations of this member of the lily family.

The Cape May National Wildlife Refuge has been designated as the first "flagship project" of the North American Waterfowl Management Plan, an international agreement between the United States and Canada encouraging federal, state and private cooperative efforts to protect and restore wetlands and waterfowl habitats. (This innovative partnership in wildlife conservation will be featured in the


September/October issue of *New Jersey Outdoors*.)

The Cape May Refuge is a vital link in another cooperative conservation effort being carried out in New Jersey—the program to establish a system of "greenways" throughout the state. The Delaware Bayshore Greenway would provide a continuous band of protected open space and bay access from Oldman's Creek (Gloucester County) to Cape May Point State Park at the tip of the peninsula.

Within this greenway are the new refuge, additional state and federal lands, a county park and preserves operated by several private conservation organizations. It is anticipated that the farmland preservation efforts of the New Jersey Department of Agriculture, future DEP Green Acres initiatives and the private efforts of conservation organizations like Ducks Unlimited, The Nature Conservancy, New Jersey Audubon and the Ruffed Grouse Society will also add swatches to this band of green.

Although the first 90 acres of the Cape May National Wildlife Refuge have been purchased, the job is far from complete. Ronald Lambertson, regional director for the U.S. Fish and Wildlife Service, aptly stated at the dedication ceremony, "Today's acquisition is but the first step toward making the Cape May National Wildlife Refuge a reality. We are solidly committed to completing this 15,000-acre refuge on an accelerated basis. Seeing it through, however, will require the continued support and involvement of all our partners."

Local support for the project has been strong since the U.S. Fish and Wildlife acquisition policies were made clear. Condemnation is rarely utilized and only in extremely unusual circumstances. Land for the refuge will be purchased exclusively from willing sellers. Garden State citizens have begun to realize that the type of residential development occurring in Cape May can be a financial drain over the long term on the local tax base due to the increased demand for services and infrastructure—a realization quite different from the conventional thinking regarding development and tax revenues.

Establishment of the Cape May National Wildlife Refuge reaffirms the importance of public-private partnerships. Its successful completion will ensure a safe haven for the millions of avian travelers that annually visit New Jersey. This joint venture will maintain the cape's regional charm and pastoral beauty and help preserve for the education and enjoyment of your children's children, for future generations of all visitors, a wildlife spectacle virtually unequaled in the Western Hemisphere. 

Planning coordinator for the Division of Fish, Game and Wildlife, **Tony Petrongolo** develops the management plans for state lands administered by the division. He also provides liaison to the Pinelands Commission.



*Not yet mindful of its importance in their future, young children enjoy the refuge dunes during the deed transfer ceremony.*

# River Divers

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# go with the flow

Photographs by author

*(left) Diving sites along the Delaware are reached more easily in motorized inflatable boats.*

*(top) At the Delaware Water Gap, shad can be seen in the river from late April until June.*



By Cathie Cush

A gallon milk jug floating on the Delaware River just south of the Route 80 bridge points the way to a world few people give themselves the opportunity to see. Visible from the boat launch ramp at Worthington State Forest, the buoy marks the site of a train wreck that lies on the riverbed. Rusting old boxcars give divers an excuse to get a fish-eye view of the river—not that avid divers need an excuse.

Divers have explored many sections of the Delaware. Here, where the face of an old Indian looks down from the mountains, is one of the most accessible. Farther downstream near the Delaware Bay, tidal currents, commercial shipping traffic and water quality virtually rule out sport scuba diving. At the Delaware Water Gap, divers can enjoy the aquatic scenery in relative safety.

A hot July day seems perfect to take a dip, as long as my buddy and I carefully avoid the numerous pleasure boats and jet skis zipping across the surface of the water. A red-and-white or blue-and-white divers' flag floating on an inner tube marks our position.

Curious sightseers wander over from the overlook as we don our gear. We could be ambassadors from Mars, judging from the looks they give us, but we're not the first divers to explore northwestern New Jersey. When we ask a park ranger if he knows anything about an old train wreck, he not only points us directly to the spot but recommends a few other potential dive spots nearby.

An inflatable or small boat is the best way to reach the train wreck on the opposite side of the river. It's too tiring to swim cross-current the width of the river here, even in mid-summer following a long spell of no rain. In spring or after a heavy rain, when the river is running fast, swimming would be plain crazy.

At this spot on the Delaware the Pennsylvania side is slack, so currents won't be as strong on the wreck as they are along the riverfront at Worthington. The strongest currents will be at the base of the river bed's "V" shape, which runs from 60 to 90 feet here. We won't venture deeper than 40 feet, and all the wreckage is much shallower.

The world beneath the surface of the river is unlike anything most divers have experienced. It's certainly not the crystal clear



Covered with rust and silt, an axle assembly sits on a shallow ledge in warm, clear water.

water of the Caribbean. Not even several years of diving on the shipwrecks off the Jersey coast prepared me for the eeriness at the bottom of the Delaware.

It is beautiful, but strange. The rocky, silt-covered riverbed reminds me of how I'd always imagined the surface of the moon, until my light illuminates an occasional pale freshwater eel or fallen tree. The visibility actually isn't bad—about 10 feet—unless we venture too close to the bottom and stir up the mud with our fins. At one spot I stick my arm down into the stuff. The silt is at least as deep as my arm is long.

It's dark, and I'm a little edgy. I've been told there are muskellunge in this part of the river. This member of the pike family can reach 60 pounds and be aggressive. In this visibility, they could get dangerously close before we'd see them. Muskies are as curious—and as evil-looking—as barracuda and deserve respect.

However, in reality I have little reason to be nervous. When it comes to encounters with large begoggled creatures wrapped in black neoprene rubber, most aquatic animals would rather sink back into the shadows than force a showdown. As it turns out, we don't see any.

On a shallow ledge along shore, in about 10 feet of warm, clear water sits one of the boxcars. Nearby are two more and the axle assembly from a tractor trailer. At this spot, within spitting distance of the center of the river, the whole nature of the dive changes. Sunlight filters through the water. Hundreds of silvery baitfish swim over our heads. Here, on the inside edge of the bend, the current is negligible. The vegetation makes the riverbed less like a moonscape.

The top of the shallowest boxcar is camouflaged with silt and vegetation. An exposed end sticks out of the mud bank nearly intact. Another car is nearby, slightly deeper, and a third upriver a bit. We aren't able to locate a locomotive. The engine probably navigated the turn in the tracks, which parallel the river, just fine. At some point the rear of the train must have derailed, sending a few of the cars sliding down the steep embankment on the Pennsylvania side. The axle assembly from the semi also attests to the treachery of the bend in the road above us.

We swim upriver against the mild current, then drift back to our starting point. Among the aquatic grasses in the sunlight shallows we find more small fish and the mother-of-pearl shells of freshwater bivalves. The river also holds rock bass, perch, and brown and rainbow trout for those who know where to look. (Before anglers start thinking that divers have an unfair advantage, spearfishing of

these species is prohibited.) We encounter surprising numbers of discarded soda cans and beer bottles. Would there be so much litter on the river bottom if everyone could see it from a scuba diver's perspective?

I'm amazed at the two totally different dives done on the same few hundred yards of river—the deep riverbed and the shallows near shore. Other river sites likely offer the potential for even more variety.

On an early June dive upstream in the Delaware Water Gap National Recreation Area, we get a treat. In spring, as the shad come upstream to spawn, we are able to sit on the bottom and watch them flash past, over and over again, chasing the small baitfish on which they feed. That dive, however, has its downside, too. The adult shad die shortly after spawning, and we find dead fish on the river bottom and along the banks.

Tocks Island, at the northern end of Worthington State Forest, is a good area for diving, if the river's not running strong. Interesting rock formations there give divers a first-hand geology lesson on how water movement over the eons carved the great gap through the mountains. The area also boasts a large population of muskies.

Whenever my buddy and I drive along the river, we pull over frequently to investigate possible new access points. The Delaware is a long river, and there are many spots worthy of exploring.


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### Delaware River Diving Tips

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In addition to keeping a cautious eye out for muskies, would-be river divers should take a few other precautions. It's important to keep their eyes open and heads up to avoid running into rocks or trees. Because divers share the Delaware with countless anglers, we have to be careful not to become entangled in monofilament. One or two knives, placed where they can be reached easily, can help.

Avoid the river when it's running fast, and never try to fight a current. First-timers should take a river diving specialty course from a local dive shop or dive with someone who knows that particular area of the Delaware (or any other river).

Divers must use a dive flag and stay within 25 horizontal feet of it. They also should register with the park office before diving. For more information on diving or recreation at Worthington State Forest, operated by the DEP Division of Parks and Forestry, call 201/841-9575. 

"Seashore Summer School" was NJO's last feature by **Cathie Cush**. She has also entertained us with stories on camping triathlons, diving and surfing along the Jersey coast and personal experiences horsepacking through the Pinelands.

# Calendar

## August

**2** CEDAR CREEK TUBING. 10:30 am, Wm. J. Dudley Park, Rt. 9, Berkeley Twp. Tube and lunch. Sierra Club. 609/267-7052.

**4-13** NEW JERSEY STATE FAIR. Garden State Park, Cherry Hill. Adm. and pkg. charge. M, Tu, W, and F 2-12 pm. Th, Sa and Su noon to 12 pm. 609/587-6300.

**5** TUBING THE BATSTO. Pine Barrens fun for all ages. 10 am. SC. 609/267-7052.

**5** OPEN HOUSE AT EAST POINT LIGHTHOUSE. Historical displays, food and maybe some kite flying. 10 am-4 pm. Delaware Bay, 2 mi. S of Heislerville. 609/327-3714.

**5-6** ATLANTIC COAST INVITATIONAL. Men's volleyball finals, 9 am-dusk. 6th Street beach, Ocean City. 201/349-7552.

**5-6** PINELANDS FOLK FESTIVAL AND CRAFTS SHOW. Antiques, crafts, Civil War reenactment, music, Pine Barrens artists. 10 am-6 pm Sa, Su to 5 pm. Atlantic County Park, Rt. 50, Estell Manor. 609/476-2219.

**5-13** SUSSEX COUNTY FARM AND HORSE SHOW. Animal exhibits, lumberjack competition, carnival rides, truck and tractor pull. \$5, under 12 \$1. Sussex County Farm, Augusta. 201/579-2215.

**10** TUBING THE BATSTO. (see Aug. 5)

**10-13** BLUEFISH MASTER TOURNAMENT benefits American Cancer Society. 75 boats expected. Frank S. Farley State Marina, Huron Ave, Atlantic City. 609/646-8414.

**11-12** LONG BEACH ISLAND LIFE-GUARD TOURNAMENT. 6-9 pm. 68th Street, Beach Haven. 609/494-4220.

**12** OCEAN GROVE KITE CONTEST. Stunt kites, competitions, prizes. 9 am. Great Auditorium, Ocean Grove. Register, 201/774-0511.

**12-13** NATIONAL SWEEPSTAKES REGATTA. Hydroplanes, speed skiffs. Noon-5:30 pm, Navesink River. Marine Park, Red Bank. 201/747-1076.

**12-13** BATTLES OF THE WILDERNESS AND SPOTSYLVANIA COURT HOUSE, 125TH ANNIVERSARY REENACTMENT. Batsto Village, Wharton State Forest, Hammononton. \$3/car. 609/561-0024. Infantry, calvary and artillery battles unfold in wooded 2-mile area surrounding the village. Forces converge on Batsto main field for the exciting climax. Nearby, approx. 25 Union soldiers are buried in the Batsto-Pleasant Mills graveyard.

**All day living history events:** military field hospital, drills, war undertaker, and period fashion show.

**12** 10 am-4:30 pm, one-day Civil War stamp cancellation commemorating reenactment, Batsto Post Office.

2-4:30 pm, Battle of Todd's Tavern and Battle of the Wilderness.

**13** 11 am-1 pm, Battle of Yellow Tavern, the Battle of Spotsylvania and storming of the "Bloody Angle."

3 pm, break camp.

**13** FESTIVAL OF HORSES. Standard bred and thoroughbred yearling show. Horse Park of NJ at Stone Tavern, Upper Freehold Twp. NJ Dept. of Agriculture. 609/292-2888.

**13** AROUND ABSECON ISLAND SWIM. Ocean marathon swim and international swim festival. Competitors from 12 countries. 7:30 am start and finish 8 hrs. later. Farley State Marina, Atlantic City. 609/646-7850.

**15-18** HEART CUP (ATLANTIC CITY RACE WEEK). Premiere sailing event along the mid-Atlantic seaboard benefits the American Heart Association. Farley State Marina. 215/735-3865.

**16** MOONLIGHT NATURE HIKE. 8 pm adventure about animals of the night. Sturdy shoes/clothes. Pequest. Reg. req. 201/637-4125.

**16-18** SOMERSET COUNTY 4H FAIR. 10 am-10 pm. County fairgrounds, Milltown Rd, Bridgewater. 201/526-6644.

**19-20** CLEARWATER FESTIVAL. Arts and crafts, ecology awareness presentations, folksingers, ethnic singing and blues bands. Sloop Clearwater rides by reservation. Noon to dusk, Sandy Hook. Monmouth Co. Friends of Clearwater. 201/872-9644.

**19-24** FISH FOR LIFE. Bluefish tournament benefits Leukemia Society. 50 or more boats expected. 8:30 am. Farley State Marina. Atlantic City. 609/784-1212.

**20** HABITAT MICRO-TREK 1-3 pm safari into the world of tiny critters. Pequest. 201/637-4125.

**26** 15TH ANNUAL SALEM MARKET STREET DAY. 10 am-4 pm. Historic homes, crafts, antique autos, model trains and more. 609/935-1415.

**26** SEA SCIENCE FESTIVAL. Sea life exhibits and services celebrate gifts of the Earth. 9:30 am-12:30 pm, Beach Haven. Alliance for Living Ocean. 609/492-0222.

**26-27** THE WILDWOODS CLASSIC CUP. Sailing regatta for more than 150 Hobie catamarans benefits Juvenile Diabetes Foundation. 10 am-5 pm Sa, to 3 pm Su, Wildwood Crest beach at Ocean and Rambler Aves. Register, Cathy Ackroyd in pm, 609/861-5674.

## September

**7-10** LIBERTY STATE PARK BOAT SHOW. \$5, \$2 under 12. 11 am-8 pm. Marina area near CRRNJ Terminal, Jersey City. 201/269-1412.

**9** 8TH ANNUAL DECOY AND WILDLIFE SHOW. Wood carving, decorative and hunting decoy contests. 10 am-8:30 pm. Ocean City Music Pier, Broadway and Moorlyn Terrace. 609/399-7628.

**9** DEEP CUT DAY. 2 pm. Deep Cut Park horticultural center, Red Hill Rd, Middletown. Monmouth Co. Park System. 201/842-4000.

**16, 23, 30** HAWK BANDING DEMONSTRATIONS. 10 am (10:30 on 30th). Hawk Watch Platform, Cape May Point State Park. 609/884-2159.

**16** BIRD WALK in search of marsh and upland species. 8:30 am. HMDC Environment Center, 2 DeKorte Park Plaza, Lyndhurst. 201/460-8300.

**16** GREENWOOD BY MOONLIGHT. 6-miler across highest elevations south of Trenton. 7 pm. Flashlight. Rt. 539, 7½ mi. S of Rt. 70, Greenwood Wildlife Management Area. SC. 609/267-7052.

**16** JERSEY SHORE SEA KAYAKING AND BAY CANOEING SHOW. Test models, demonstrations, race and nature cruise. 9 am. Berkeley Island State Park, Bayville. Ocean Co. Parks and Recreation. 201/370-7380.

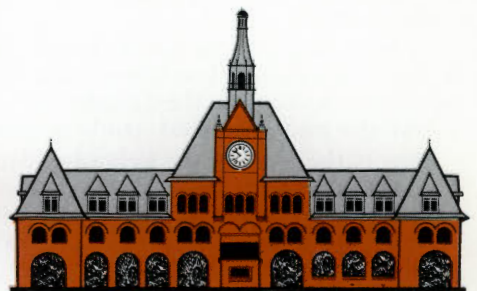
**16-17** 7TH ANNUAL WINGS 'N WATER FESTIVAL. Celebration of New Jersey's coastal environment, nature walks, artists, exhibits and more. 10 am-5 pm, Su to 4 pm. \$8, \$2 children. Benefits the Wetlands Institute, Stone Harbor. 609/368-1211.

**17** "HOW SWEET IT IS." 1-3 pm. honeycomb/honey extraction demonstration. Bee there! Pequest. 201/637-4125.

**20** INTRO TO BOW HUNTING. Bill Wadsworth, National Bowhunter Education Foundation, 8 pm bow hunting seminar. Pequest. 201/637-4125.

**23-24** BIKE TOUR FOR MS. Two day, scenic 100-mile tour benefits Bergen-Passaic Chapter, National Multiple Sclerosis Society. Ramsey to Port Jervis, NY, overnight in Sussex and return via chartered NJT train. 201/837-0025.

**23-24** BARNEGAT BAY DECOY AND GUNNING SHOW. Antique decoys, carvers, traditional south Jersey and model boats, decoy contests, over 300 exhibits. 9 am. Tip Seaman County Park, Lakeside Drive and Rt. 9, and Pinelands HS, Naughtown Rd, Tuckerton. OCP. 201/370-7380.




## Liberty State Park

### Historic Gateway to America

**30** CENTENNIAL ANNIVERSARY OF THE CENTRAL RAILROAD OF NJ (CRRNJ) TERMINAL. Noon, terminal rededication. 10 am-2 pm, harbor boat tours, music, dance and food. Liberty State Park. 201/915-3409.

By Christopher M. Roberts

# “Good Faith” Restoration of the Delaware



Its good wing thrashing, the injured duck retreated in circles, quacking as a man and a boy in a canoe chased it. Near shore the bird was snared by underbrush. Discarded fishing line tightly held the other wing and a leg in a monofilament trap, cutting into the leg.

As the man held the duck, the boy cut the tangled line with a pocket knife. Both wings pumping now, the bird splashed away from the riverbank and lifted off the water.

The duck taught the boy something about the river. The young canoeist had witnessed the harm inflicted when man and nature clash in competition over a common resource, be it a stream, river or mountain. He had witnessed, too, the good that can happen when people work together.

In the small part of an afternoon, he had learned the lesson. It had taken his forefathers centuries, and when they finally did understand, the hourglass had nearly emptied.

This is the story of the Delaware River and Bay, about a valley spoiled by man who then tried to clean it up. It is about a valley that in recent years suffered through record flood and drought, calamities that helped remove political fences and make better neighbors.

The end of the story has not yet been written. The boy's children and their children will do that.

As rivers go, the Delaware is not a big river. Fed by runoff from parts of four states, it flows through the nation's fifth largest urban area, supporting 22 million people. Water use and water-dependent activities increase competitively with each river mile as the Delaware

tumbles out of New York's Catskill Mountains, ripples over the rocks at the head of tide in Trenton, and then glides toward the bay, past Philadelphia and a giant concentration of heavy industry and the second largest oil refining-petrochemical center in America.

The Delaware River Basin extends from the river's headwaters above Hancock, New York, 339 miles south to the mouth of Delaware Bay. The basin contains 12,755 square miles, draining portions of Pennsylvania (6,422 square miles or 50.3 percent of the basin's total land area), New Jersey (2,969 square miles, 23.3 percent), New York (2,362 square miles, 18.5 percent) and Delaware (1,002 square miles, 7.9 percent).

Rafters and tubers dot the river on hot summer days. Fishermen hunt out open water. Advocates of free-flowing rivers and open space live on the river's banks, as do land developers and dam builders. Pleasure craft dodge tankers in the river's busy estuary. Thirsty governments compete for her waters. Although the basin drains only 0.4 percent of the U.S. land area, almost 10 percent of the nation's population relies on the water of the Delaware River Basin for drinking and industrial use.

Among the first recorded inhabitants of the basin were the Lenni-Lenape Indians, who fished and clammed in the waters and grew corn and squash on the land.

In 1609 the valley changed forever, when a giant wooden bird with square white wings appeared on offshore waters. European explorers had arrived.

A former Associated Press correspondent, **Christopher M. Roberts** is the Delaware River Basin Commission public information officer. This is his first *New Jersey Outdoors* feature.



The Dutch settled the valley first, followed by the Swedes and the English. They cut down forests, plowed the fields, dammed the streams and built lumber and grist mills.

Waterfront forts became towns: some towns, cities. Among the early settlements were Salem and Greenwich, Lewes and New Castle (formerly Fort Casimir) in Delaware, Philadelphia and Upland (now Chester) in Pennsylvania, and the New York bluestone quarry towns of Kilgour Spur and Pond Eddy.

The river and bay, and the numerous tidal streams extending from them like arthritic fingers, were magnets for growth, offering vital transportation links. Rich fishing grounds lay offshore, as did the trade routes to Europe.

As cities and towns grew, water drawn from the basin for use by the people was returned as raw sewage. Belching factories, coal mines, tanneries, iron and steel mills and giant shipyards sprang up. The waste and the wastewater from producing their goods went into the river, bay and streams. Deadly epidemics spawned by waterborne diseases broke out. Coal silt suffocated the Schuylkill River, the Delaware's largest tributary.

By World War II the lower Delaware had become an open sewer, spewing septic gases that tarnished ships' metalwork and sickened sailors. Little or no oxygen remained to support fish and other aquatic life. The Delaware was near death.

The people in the basin, slow to learn that

they had fouled their own nest, began to look for answers.

But what was the solution? Attempts had been made before to manage the river, but the efforts were piecemeal, fraught with selfish motives. Turf wars were fought over water diversions, dam construction and fishing rights. Disputes reached the U.S. Supreme Court.

Whose river was it anyway? It was a vexing question, not unlike the one raised in "Uncle Sam's River," a turn-of-the-century ballad.

The river belongs to the Nation,  
The levee, they say, to the State;  
The Government runs navigation,  
The Commonwealth, though,  
pays the freight.

Now, here is the problem,  
that's heavy—

Please, which is the right or the  
wrong—

When the water runs over the levee,  
To whom does the river belong?

The river didn't belong to anyone—it belonged to everyone. It was a common resource with common troubles that bridged political boundaries. Its problems called for common solutions, to be worked out by the nation, the states and the people.

It was an idea that would flourish, helped along by a deadly flood and record drought.

In July 1955 the governors of Delaware, New Jersey, New York and Pennsylvania and the mayors of Philadelphia and New York City first met to discuss the idea. The four basin states

*(left) Near the cooling towers on Artificial Island, the Delaware Bay becomes a busy, commercial river estuary.*

*(right) Due to the improved water quality, tubers now enjoy the river north of Trenton.*



Wide World Photos

*In a 1961 White House ceremony, President John F. Kennedy and the governors from three of the basin states sign the compact. New Jersey Governor Robert B. Meyner is seated on the far left.*

already were members of an advisory committee, formed in the 1930s, called the Interstate Commission on the Delaware River Basin (INCODEL).

Under INCODEL, in-stream water quality standards were eventually established. The silt-choked Schuylkill was dredged. Sewage treatment plants were upgraded, resulting in improved water quality by the 1950s.

It had been a good beginning, but as an advisory committee INCODEL was without regulatory muscle. Something stronger was needed. The chief executives met that July day to talk about the creation of a regional body with the force of law to oversee a unified approach to the development and control of the river system.

A month later, the worst flood in the valley's recorded history, which resulted in 99 deaths across the basin, stirred a public clamor that prompted Congress to direct the U.S. Army Corps of Engineers to forge a comprehensive physical plan for the basin's waters.

Completed in December 1960, the massive document advocated a 50-year development program of 58 water control projects at a cost of \$591 million. The chief executives of the four states continued to deliberate and, on September 30, 1959, accepted an advisory committee's recommendation for a joint federal-state commission to be created by compact.

The necessary legislation for the compact's enactment was drafted. On February 1, 1961, the chief executives endorsed the package. By summer's end it had won approval in Con-

gress and the four basin state legislatures. Joining the four governors as a signatory, President John F. Kennedy added his name to the congressional action on September 27, 1961.

Thirty days later the Delaware River Basin Compact became law. Creating the Delaware River Basin Commission (DRBC) marked the first time in our nation's history that the federal government and a group of states had joined together as equal partners in a river basin planning, development and regulatory agency.

The hurrahs and handshakes gave way in the months ahead to concern. The flood, fed by the soaking rains of two trailing hurricanes, had left a fear of high water in the valley. The record drought that lay just ahead would show how precious little water there was when it didn't rain hard enough.

To understand the significance of the 1960s drought we must turn back to the 1930s, a decade which recorded the previous drought of record. It also had been witness to an historic court action involving out-of-basin diversions that would create unique challenges for the Delaware's future water managers.

On May 25, 1931, the U.S. Supreme Court granted New York City, which lies 100 miles outside the basin, the right to withdraw 440 million gallons a day (mgd) of water from the Neversink Reservoir, an in-basin impoundment the city was building in the Catskill Mountains.

The court decree stood for 23 years until the decree parties—the four basin states and New



York City—again returned to the court in a dispute over the city's right to divert water. An amended decree, adopted June 7, 1954, permitted New York to increase its withdrawal rate to 800 mgd contingent upon the city's completion of two additional, in-basin water supply reservoirs—the Pepacton impoundment on the Delaware's East Branch (built in 1955) and the Cannonsville impoundment on the West Branch (completed in 1967).

The city, in return, had to release into the Delaware sufficient water from the three upper basin reservoirs to meet a flow objective of 1,750 cubic feet per second at the tri-state line at Montague that assured adequate streamflows downriver. A court-appointed rivermaster would oversee the decree, including the permitted out-of-basin diversion of 100 mgd to central and northeastern New Jersey through the Delaware and Raritan Canal.

The high court had based its 1954 water-sharing formula on the 1930s drought, then the drought of record. The 1960s drought, however, was much more severe, so severe, in fact, there simply wasn't enough water for both the city and the river. The Supreme Court unwittingly had been too generous in divvying up the basin water pie.

The 1960s drought changed the course of water resources management in the basin, as did a decision a decade later on the construction of a mammoth reservoir at Tocks Island, to be harnessed by a dam across the Delaware's main stem.

With a 100-mile shoreline, the Tocks Island Reservoir, cornerstone of the 1960 report by

the Corps of Engineers, would stretch 37 miles upstream from just north of the Delaware Water Gap. Providing hydro-power, flood control, water supply and recreation, the dam was designed to hold back some 250 billion gallons of water, a huge amount considering New York City's three in-basin reservoirs, with a combined storage of 271 billion gallons, today account for 90 percent of the basin's manmade, surface water supply.

Early support for Tocks was eroded by Vietnam War-induced construction cutbacks and a budding environmental movement increasingly opposed to damming the last major free-flowing river east of the Mississippi.

On July 31, 1975, Delaware, New Jersey and New York voted against congressional funding for Tocks, but the DRBC failed to recommend that Congress deauthorize the project. With the dam's future thus clouded and the decade-earlier drought still a troublesome memory, the basin's water managers pondered whether to engage again in costly, lengthy litigation, return to the Supreme Court for yet more adjustments, or draft a new blueprint for future water supply management.

At the DRBC's urging, the four basin states and New York City agreed in the late 1970s to deliberate in "good faith" on their own.

Unanimous consent among the parties was reached in the fall of 1982 in a document entitled "Interstate Water Management Recommendations of the Parties to the U.S. Supreme Court Decree of 1954 to the Delaware River Basin Commission Pursuant to Com-

*(left) Nestled on the New Jersey side, the Riverton Yacht Club rises from the river opposite Philadelphia amid all the commercial and recreational traffic.*

*(right) Downriver from the boathouse in Riverton, the Tacony-Palmyra bridge connects Burlington County with northeast Philadelphia.*



Ronald W. Wynkoop Sr.

mission Resolution 78-20." Not surprisingly (and perhaps mercifully), it became known simply as the "Good Faith Agreement."

The document's 14 recommendations focused on water conservation, drought management and construction of additional water storage reservoirs. Nine of these recommendations already have been implemented by the DRBC. Others are being pursued.

Among the "Good Faith" accomplishments are two drought management plans (one to deal with basinwide droughts, the other lower basin droughts). Because the basinwide plan calls for cutbacks in diversions to New York City and New Jersey, valves were turned and some 80 billion gallons of water saved during the 1985 drought.

Also, Merrill Creek Reservoir, a \$217 million pump storage impoundment near Phillipsburg, was completed recently by a consortium of electric utilities. Releases from the 15 billion gallon reservoir make up for water evaporated at the utilities' in-basin generating plants during the Delaware low flow periods. Special releases from the New York City reservoirs to protect coldwater fisheries in the upper Delaware have been authorized on a permanent basis.

The framers of the "Good Faith" pact made mid-course corrections to the 1954 decree, addressing the weather's latest whims while recognizing the paucity of federal dollars for new reservoir projects. The "money drought" shifted attention and concrete efforts to another area: water conservation.

Saving water during wet as well as dry years became a popular concept. Within a two-year span, the DRBC had adopted regulations that

- require leak detection and control programs for in-basin, public water suppliers to locate unaccounted-for water projected at 240 million gallons a day. Treatment and delivery costs for that lost water are estimated at \$80 million a year.

- require the metering of major, in-basin, public water supply systems at the customer end of the pipe with all water bills based on metered usage instead of a flat, periodic rate for an unlimited supply. Water consumption is a pocketbook issue when the economic incentive to save water saves money.

- establish water conservation performance standards for toilets, lavatory faucets and shower heads installed during new construction or major renovations. Basinwide savings of 110 million gallons per day are projected by the year 2020 as a result of switching to these water-saving devices.

DRBC member states initiated their own water conservation efforts. New York City, the single biggest user of Delaware River surface water, began a 10-year program to install 630,000 water meters in residential buildings. Projected cutbacks in water use, once the program is completed and metered billing is in place, equate to 300 million gallons a day. A leak detection and repair program to locate breaks in the city's 6,300 miles of underground pipes has also been initiated.

The "Good Faith" pact, record drought and

flood, and a decree of the nation's highest court all made headlines. Yet something else happened in the basin; because it didn't involve natural calamities or prominent statesmen, it wasn't receiving as much attention. The Delaware and its tributaries were becoming a lot cleaner and was worthy of the limelight.

The DRBC, in its comprehensive plan for managing the basin, had included water quality standards established by INCODEL in the early 1940s. New, higher standards were adopted by the DRBC in 1967, based on a water quality model developed by the U.S. Public Health Service, forerunner of the federal Water Pollution Control Administration and the U.S. Environmental Protection Agency. To meet these new standards, the next year the DRBC issued wasteload allocations to 90 major dischargers in the basin.

Antiquated sewage treatment plants were being upgraded, in part with funds from the 1972 Federal Water Pollution Control Act. Water quality studies on bacterial concentrations, toxics, thermal stress, sediment oxygen demand, chlorination, heavy metals, pesticides, phenols, PCBs, and the impact of combined sewer overflows were initiated.

In 20 years, this joint federal-state pollution abatement effort has resulted in a 76 percent reduction in the amount of oxygen-demanding wastes being discharged into the Delaware River estuary, the tidal stretch between Trenton and the bay.

As a result of these cleanup efforts, the Delaware today supports year-round fish populations, offering excellent smallmouth bass, walleye and trout fisheries. Once again sustained by restored oxygen levels, shad, sturgeon, herring and other anadromous fish (species that return from saltwater habitats to spawn in freshwater rivers and streams) are increasing in numbers. A recent study of shad fishing in the basin placed a \$3.2 million annual value on this fishery alone.

Marinas are being built on the river's banks, along with parks and bike trails. Two stretches of the upper Delaware have been included in the National Wild and Scenic River System. The first section extends 73 miles from the confluence of the east and west branches of the river at Hancock, New York, downstream to Mill Rift, Pennsylvania. The lower designated corridor extends from just south of Port Jervis, New York, 35 miles downstream to the Delaware Water Gap.

## The Future

The duck winged higher, then veered north and disappeared over a ridge. The man and

boy paddled downstream and beached at the Delaware Water Gap, the final stop on a three-day journey past lush woodlands, bluffs, islands and corn fields.

With fresh images of a world filled with chuckling river riffles, jumping fish, white-tailed deer and red-tailed hawks, they headed home by car over Interstate 80, a major four-lane highway which crosses the river at the gap, a concrete stream flowing past new shopping malls, industrial parks and housing projects.


This incredible contrast underscores the real challenge facing the basin's future water managers. They must both allocate and protect a limited resource. They must preserve the natural beauty of the Delaware and her tributaries while allowing for orderly growth. They must provide enough water through new storage projects and water conservation programs to meet the needs of these thirsty new communities while making certain enough fresh water flows downstream to control saltwater invasion of the estuary.

Surely, as in the past, there will be differences. It's foolish to think that presidents, anglers, members of congress, scientists, governors, boaters, developers, homemakers and business people are ever going to agree precisely on anything. Learning from the mistakes of the past, they now share a common concern for this common resource.

## The "Good Faith" Partners

The members of the Delaware River Basin Commission, responsible for water resources management in the basin, are the governors of the four basin states and a presidential appointee, traditionally the Secretary of the Interior.

Numerous other agencies are involved in the management effort and work closely with the Commission. They include the Delaware Department of Natural Resources and Environmental Control, the New Jersey Department of Environmental Protection, the New York Department of Environmental Conservation, the Pennsylvania Department of Environmental Resources, the Pennsylvania Fish Commission, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the National Park Service, the U.S. Army Corps of Engineers and the U.S. Geological Survey.

"Watchdog" organizations like the Water Resources Association of the Delaware River Basin and the Watershed Association of the Delaware River also play an active and important role in shaping the management and regulatory process. 

*Upstream of the confluence of the Lehigh River (upper left) with the Delaware, the Old Covered Bridge linked Phillipsburg's Union Square (foreground) with Easton, Pennsylvania. Opened to traffic in 1806, the toll bridge withstood every known flood, including the famous "Flood of 1841" that washed away every bridge from Phillipsburg to Trenton, until it was replaced with a modern cantilever-type iron bridge in 1895.*

Chief of the DEP Office of Water Policy Analysis, **Dr. Joseph A. Miri** also serves as vice-chairman of the DRBC Water Conservation Advisory Committee.



By Joseph A. Miri

The many drought warnings and emergencies which have plagued New Jersey and the other Delaware River Basin states during the 1980s, and in the past, serve to emphasize the importance of water conservation by all of us. Water is one of our most precious natural resources, essential to life. Yet it seems that other resources, such as oil, are more highly prized by society and rationed with greater concern.

Most motorists probably consider driving a gas-guzzling car during a fuel shortage unwise. Living in a house with leaky or inefficient plumbing is also costly, though it's not necessary to buy a smaller house to become more "water efficient." There are several inexpensive ways to "tune-up" your home's plumbing and redefine your own water-use habits.

Water conservation is essential at all times, rain or shine, and not just during shortages. Just as the wise motorist would not drive a gas guzzler when fuel prices are low, knowing shortages in supply and delivery of finite resources are inevitable, water conservation also starts with the individual water user. This becomes more evident when we realize that less than one percent of the earth's water is potable.

### INDOORS

The typical family of four, living in a residence with standard plumbing, uses up to 360 gallons of water a day. This does not include leaking faucets or toilets which quietly waste hundreds of gallons more. Untold dollars and

thousands of gallons of clean, delivered potable water could be saved annually if these few, easy guidelines are followed.

### Leaks

Use the water meter to discover leaks in your home. Turn off all the water in the house and record the initial reading. Any change in that number after 15-20 minutes indicates a leak and its flow rate. Your water meter can also be used in the same way to measure how much water household appliances use.

The toilet swallows about 40 percent of all the water used in the home. A leaky toilet can waste up to 200 gallons of water a day. To check for leaks, put a few drops of food coloring in the tank.

# One of Our Most Precious Resources is Going Down the Drain!

If it shows up in the bowl after several minutes, a repair is in order.

A dripping faucet wastes up to 15 gallons of water a day. Fixing faucet leaks may only be a matter of spending a few cents for new washers.

## In the Bathroom

The bathroom is your home's biggest water guzzler, consuming 75 percent of all water used in the house. Replace "high-flow" shower heads with "low-flow" models which use less than half the water. Bathroom (and kitchen) faucets can be refitted with spray taps or aerators which mix air and water into a spray and reduce the flow.

While soaping up or shampooing, turn off the water. Turn the faucet off or use a cup for rinsing while brushing your teeth. Fill the basin while shaving.

If your toilet is more than five years old, it probably uses five to seven gallons of water per flush. To reduce the amount used, place some quart-size plastic bottles, filled with water and stones, in the tank. Make sure that the bottles do not interfere with any moving parts. An alternative method is the installation of one or two toilet dams. These plastic or rubber-coated shields, fitted inside your tank in seconds, will hold back a gallon or two with each flush.

The toilet is not a wastebasket. Clean water should not be used to flush cigarette butts, facial tissues or any of those occasional household visitors like spiders.

Plumbing fixtures and toilets installed during new construction and major renovations in New Jersey are required to meet performance standards set by the state and the Delaware River Basin Commission (DRBC). These uniform, basin-wide conservation plumbing standards require that new toilets use no more than 3.5 gallons of water per flush, beginning January 1, 1990. These "water-saving" fixtures and fittings already were required in New Jersey since 1978 changes to the state plumbing code.

The DRBC's 3.5-gallon standard, amended this past May, now requires that all new toilets use no more than 1.6 gallons of water per flush, effective January 1, 1991. These "low-consumption" toilets are already on the books in

Connecticut, Massachusetts, Rhode Island and Washington, in New York City and Los Angeles, and in portions of Maryland.

## In the Kitchen and Laundry

Twenty percent of the water used in the home is for laundering. The washing machine, one of the chief water-guzzling home appliances, requires 25 to 35 gallons or more of clean water per load. The remaining five percent slice of the household water-use pie is consumed in the kitchen.

Here, the dishwasher is the main perpetrator, rinsing away about 20 gallons a load. With this much water (especially energy-requiring hot water) at stake, it makes sense to run these appliances only with full loads. When purchasing a new dishwasher or washing machine, consider both its water use and energy efficiency.

If washing and rinsing dishes by hand, use a sink stopper or fill a dish pan. It is not necessary to cut down on water used for drinking or cooking, but a bottle of drinking water kept in the refrigerator avoids wastefully running tap water until it's cold.

## OUTDOORS

Most non-essential water use occurs outdoors in summer, the traditionally drier months of the year. Car washing, pool filling, gardening, lawn watering and sidewalk cleaning cause water demand to peak and shortages in delivery to occur. Prudent use of water supplies outdoors can avert these problems.

## Lawn Care

Running the garden hose can double the daily water consumption. Sprinklers should be set to water plants, not streets, sidewalks or driveways. Little of the water wasted by sprinkling the street is returned to rivers or waterways already depleted by low flow, drought or hot weather.

Minimize this waste by watering your lawn slowly and thoroughly each time but less often. Frequent light waterings keep moisture near the surface, promoting the growth of shallow roots and making plants less drought-tolerant. When a one-pound coffee can

sitting in the sprinkler's path holds an inch of water, you have watered the root zone sufficiently in most soil types.

Water during the coolest times of the day. Early morning is best to minimize loss to evaporation. Do not water on windy days; the water often ends up where you don't want it, and evaporation is greater.

Don't mow the grass too short. Grass cut shorter than two inches will be less drought-tolerant. Taller grass also prevents sunlight from reaching the weeds.

## Landscaping

Use mulch on garden plants and shrubs to reduce evaporation and weeding. Avoid trying to grow grass on steep slopes, among rock outcroppings or in the dense shade of shallow-rooted trees. Use alternatives in these areas, such as mulch or living ground covers. Consider planting native or drought-tolerant plants, shrubs and trees. Get advice from your local nursery on suitable plants.


## The Car

Letting a nozzle-less hose run while washing the car wastes six times more water than a pail and nozzle. A hose with a pistol-grip nozzle lets you sensibly use about 15 gallons. Wash the car in sections, turning on the hose to wet and rinse with short bursts.

## Water Conservation Information

Water-saving suggestions are contained in materials available from the DEP Office of Water Conservation. These include "Water Conservation for Homes, Institutions and Business"; "Water Wheel: Your Guide to Home Water Conservation"; "Landscaping for Water Conservation: A Guide for New Jersey"; and "Easy Ways to Save Water, Money and Energy at Home."

To request single copies or obtain additional information on saving water, contact:

Office of Water Conservation  
DEP Division of Water Resources  
401 East State Street  
Trenton, NJ 08625-0029  
609/633-1179 

# T • R • E • A • S • U • R • E • S

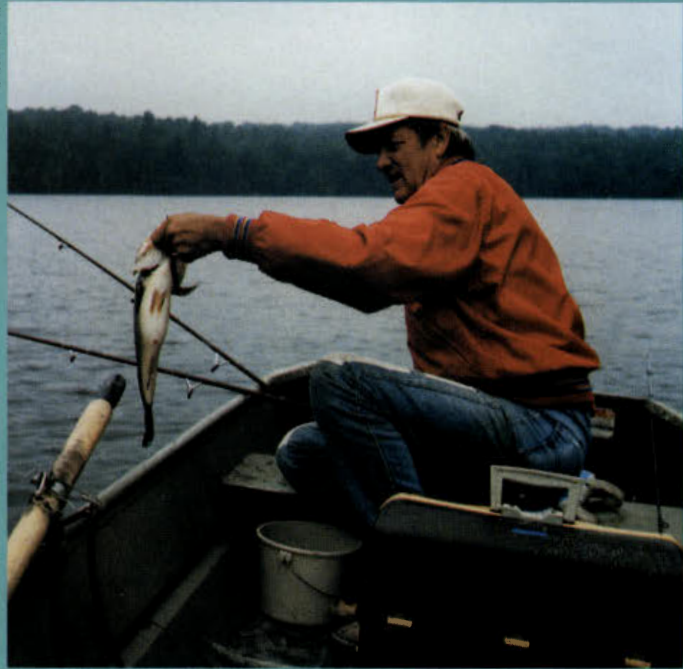


*Dense stands of Atlantic white cedar supported an 18th-century shipbuilding industry in Cape May peninsula.*

Paul E. Taylor

# of the Delsea Drive

Jim Potts



*(top) The author, holding one of south Jersey's most sought after quarry, has fished Ludlam Pond since 1982.*

*(bottom) Jake's Landing on Dennis Creek is a reminder of earlier industries in the cedar swamps.*

By Jim Potts

The lower Delaware Bay area of New Jersey has a unique regional history that is difficult to imagine today. The peaceful scenes that meet the eye of today's traveler along the Delsea Drive belie the nature of the industries present in earlier days. One would not suspect that the area provided a haven for pirates or that it was the site of a unique lumber "mining" operation in the 1800s.

Prior to the appearance of the first white settlers, the Cape May area was home to the Kechemache (Lenni-Lenape) branch of the Algonquin Indians, a peaceful tribe. Chief Nummy is still well-known in the region, and a lake near Woodbine bears his name.

At that time, Cape May was almost an

Jim Potts





THE HENRY LUDLAM INN

*This North Dennis Inn was the birthplace of Henry Ludlam in 1752.*

island, isolated from the rest of the state by the Great Cedar Swamp, which was nearly impassable by normal modes of travel. Access to the area was mainly by the Delaware Bay, first visited in 1524 by Giovanni da Verranzano. However, it was not until 1623 that Cape May received its name from a Dutch visitor, Cornelius Jacobsen Mey.

A trail of the Kechemache tribe, one of the main connections between Cape May and the western part of the state, was known as the Burnt Causeway. Along it grew dense forests of giant white cedar trees, straight and branchless for the first 50 feet or more, in the swampy land around the town now known as Dennisville.

The area near Dennis Creek was home to lumber mills, a shipbuilding industry, shingle mining, paper mills and pickle canning factories from about 1700 to 1900. It was also the home port of privateers. Regarded as patriots, they harassed British shipping during the American Revolution. Their vessels docked and sailed from Ludlam's Landing on Burnt Causeway, which today exists as the Delsea Drive (Route 47).

The great cedar forests, cut for the shipbuilding industry which started in 1705, were gone by the 19th century. Indirectly this led to the development of a new industry. Men

digging peat from the bogs where the forests had been discovered great cedar logs buried under the mud and water. These logs, some of which had been buried as long as 3,000 years, were in perfect condition as if the tree had just been felled.

There has been no good explanation for the condition of the logs, but the south Jersey water was probably a factor in their preservation. Discovery of this buried treasure resulted in the "shingle mining" industry. Digging up these logs and cutting them into shingles lasted until the beginning of this century. Shingles from this Cape May operation were used on Independence Hall in the mid-1800s.

A number of creeks feeding the lower Delaware Bay drain the south Jersey swampland. Many were dammed during the early settlement of the area to provide power for grist mills and saw mills, as far back as the early 1700s.

Some of these dams still exist. On West Creek there is Pickle Factory Pond, the site of an early paper mill and later a pickle canning operation. There is also East Creek with a pond of the same name. To the east of these ponds, two millponds on branches of Dennis Creek have a special history.

While these millponds have long since

outlived their original purpose, they currently provide recreational pleasure in the form of fishing and as sites for vacation homes or camping.

In 1690 John Townsend arrived in the area and sought the help of Joseph Ludlam of Dennis Creek in constructing a home. Joe Ludlam was able to convince the Kechemaches to help with the construction of the Townsend home. His relationship with the Indians suggests he had been in the area for some time. This early reference to the Ludlam family in Cape May County presaged an era in the development of south Jersey in which the family would play an important role.

Joseph Ludlam apparently was a mighty man. After construction of the Townsend House, a celebration was held that included wrestling bouts: The Indians first wrestled each other and then challenged the champion of the white men. The whites concocted a strategy to impress the Indians by holding fake bouts in which a rather small and weak Christopher Leaming emerged as the champion. The Indian champion was surprised when the whites then elected their seemingly worst wrestler, Joe Ludlam, to face them. Ludlam made short work of the best of the Indians, and little Chris Leaming was, thereafter, looked on with awe and great respect by the astonished red men.

In 1703, Ludlam purchased the area now known as South Dennis, between Dennis and Sluice creeks, and later land at Dennis Creek. He prospered and established a grist mill powered by damming one of the branches of Dennis Creek, thereby creating Ludlam Pond.

The sons of Joseph prospered. A grandson, Joseph II, was the area's first tavern owner. The taverns stretching across south Jersey served as stations in the transport of supplies and prisoners captured off the coast by pirates, smugglers and privateers. Goods were conveyed by heavy wagons, fitted for travel through the sandy roads and driven by redemptioners and African and Indian slaves. Joseph II sired the son that would highlight the Ludlam dynasty.

Henry Ludlam was born on the family estate in 1752, the year before his father died. Henry owned a large piece of the land his great grandfather had purchased in 1719 and located the family homestead there. He resided here with his bride Hannah Smith in 1772, the same year the First Baptist Church of Cape May was founded. Henry offered the millpond adjoining the homestead for use in baptismal services. Another resident, David Johnson, also offered a millpond to the east of Ludlam's Pond along the Burnt Causeway for area worshippers.

Henry launched a privateer to harass British shipping off the coast, as did many others. These sea-going patriots docked and sailed their ships from Ludlam's Landing, built by Henry's brother Thomas. Another brother, Joseph, was reported to have been the first to break through the Great Cedar Swamp, building a bridge to allow access to the north.

In 1778, Henry and brother Joseph played an important part in guarding the coastline from the British who were destroying the Salt Works along the shore. The hot, tiresome process for extracting salt from sea water involved the summer sun evaporating ocean water held in large shallow vats, leaving the salt to be gathered by the servants and Indians.

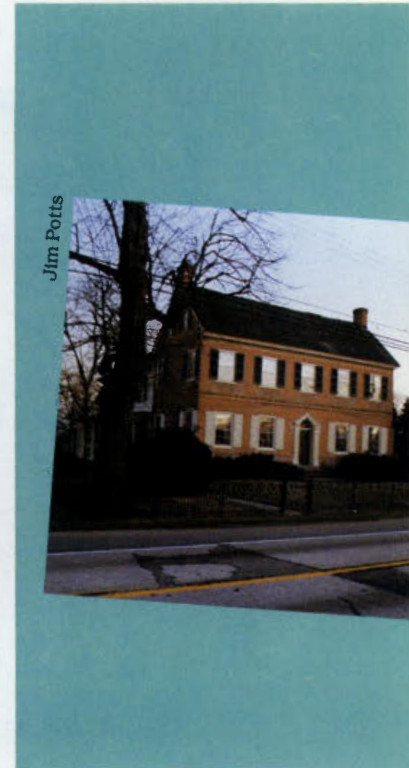
The marriage of Henry to Hannah Smith in 1772 resulted in nine children. Of these, son Richard Smith Ludlam was a pioneer and adventurer. He was instrumental in building the first resort area of Cape May County when in 1830 he built the second largest hotel in the area, "The Mansion House." He managed the hotel until it burned in the great Cape May fire in 1857. During that time he was host to the Lincolns, Henry Clay and many other famous persons of the era.

Henry Jr. resided on the family homestead and operated the mill. His daughters taught school and music, bringing education to a still untamed land. Daughter Hannah married William S. Townsend. Their daughter Annabelle would be honored when the village of Belleplain was named for her. Not far from Dennisville, the village was thought to be as beautiful as the woman for whom it was named.

Brother Joseph's son, Captain John Smith Ludlam, still makes news today. A noted Wreck Master or privateer, he sailed many times from Ludlam's Landing. These seamen would rescue the crew and passengers from a ship in trouble. After seeing to their safety, the privateers would return to the ship for salvage as was the custom of the times.

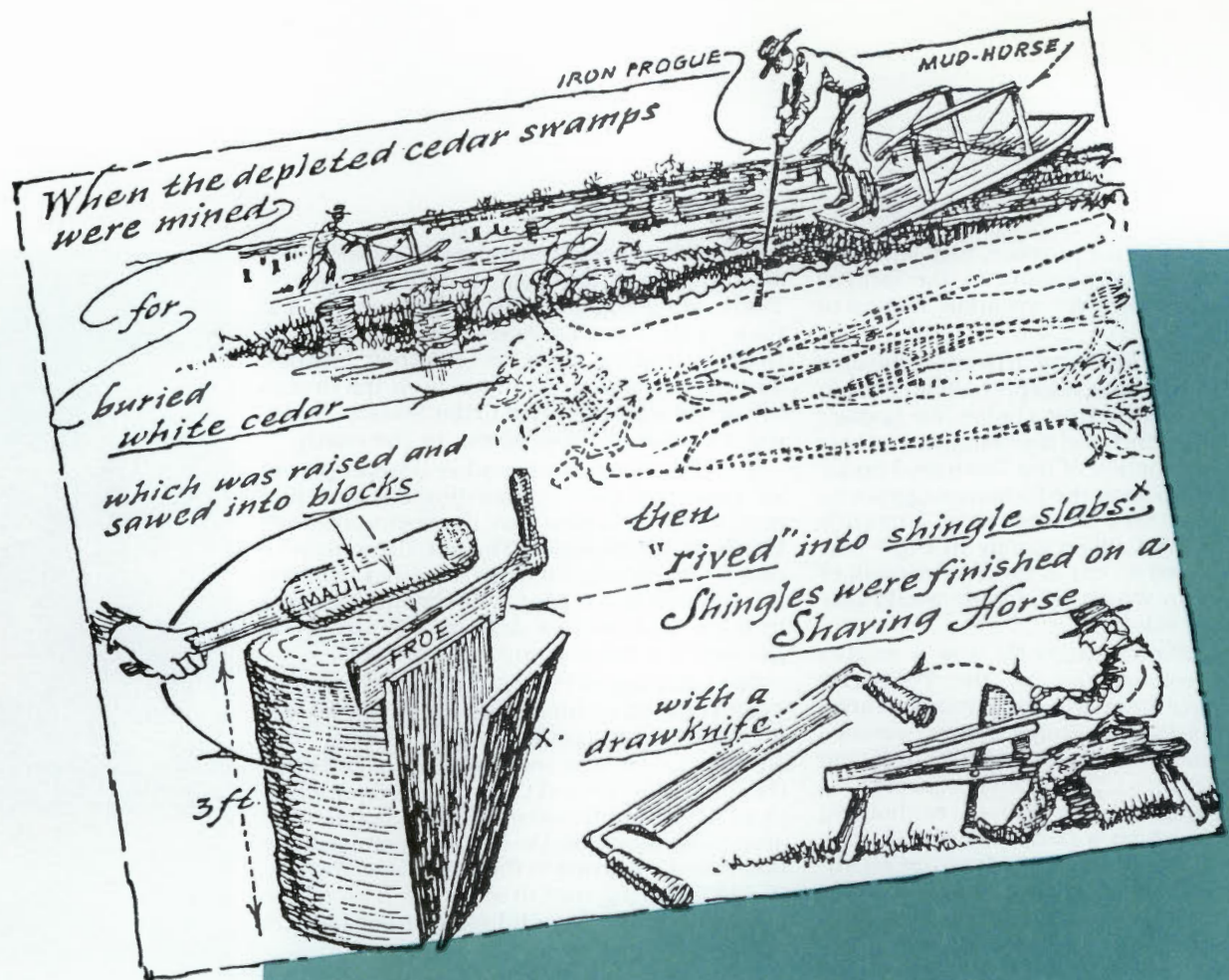
One of John's colleagues in the Wreck Master activity was Captain William Thomas, known as Blackbeard, although not the infamous Captain Blackbeard. One of their adventures is supposed to have netted 500 million dollars in gold and silver bars. To this day it is thought to be still hidden near the Ludlam Millpond. If the fishing isn't sufficient incentive to visit, perhaps the treasure might be. Modern day treasure hunters still seek this prize. A few years ago a treasure hunter visited the region, seeking leads from residents on the Ludlam who sailed with Captain Blackbeard in the early 1800s.

The house where Henry was born, on the western shore of Ludlam Pond and the Delsea



Homes like the Joseph Faulkburg House, built in 1801, and those of James Ludlam and William Townsend still stand along the Burnt Causeway in South Dennis, Goshen and Dennisville.

A lifelong fisherman and internationally recognized satellite communications authority, the multi-faceted **Jim Potts** spun lores and lures in his definitive work, *Book of the Black Bass II*.



Many of the rare and unique tools used in shingle mining are on exhibit at the Cape May County Historical Museum. Open Monday to Saturday, the museum and the Cape May County Historical and Genealogy Society are on Route 9 in Cape May Court House.

Drive in North Dennis, is now called the Ludlam Inn. Less than a mile down the road in Dennisville is the other millpond, still known by its original Johnson name.

These ponds today provide some of the best fishing water in south Jersey. Unlike ponds on East and West creeks, they do not have the characteristic cedar-colored water. In fact, Ludlam Pond is crystal clear. One can easily see on the bottom huge cedar stumps of trees cut for lumber by the shipbuilders in the 18th century. Although Johnson Pond is not as clear as Ludlam, stumps in that pond also show. And the bass really love both ponds.

I have fished these ponds since 1982 and spent many memorable days angling for bass. During my first time at Johnson Pond, I caught more bass than I had ever caught in a south Jersey pond. Over the years I've been back a number of times, and the fishing is always good.

Johnson and Ludlam ponds, formed by dams on two different branches of the Dennis Creek estuary, have a continually renewed supply of good south Jersey water. Dennis Creek is one of the two main drainages for the Great Cedar Swamp. Whether this accounts for the ponds' apparent fertility, I can't say, but they do support a great number and variety of fish.

The fish originally native to these waters were likely pickerel and yellow perch. Other species such as black bass, perhaps of the greatest interest to fishermen, were introduced. There are also crappie, yellow perch, slab-sided bluegills, and channel catfish weighing up to 15 pounds. The state used to stock trout in Johnson Pond. Since public access is now limited largely to roadside and bank fishing, trout are no longer stocked each spring.

Black bass might be south Jersey's best fishery. Johnson Pond was cited in 1982 by *Sports Afield* as one of New Jersey's best bass waters. It has earned this reputation, having given up a 10-pound fish in 1987. The pond at Ludlam doesn't get as much attention except from locals, but it has its own special historical charm.

Henry Ludlam Sr. and the generations of children that followed had an impact on Dennis Township, Cape May County and New Jersey. He provided land for his children and deeded to area residents the "Ludlam School" in 1801. Some of the homes of his children and grandchildren that stood along the Burnt Causeway still stand in testimony to the Ludlam family and their contribution to the area. South Jersey was well cared for by those before us. We must be mindful to do the same.

## From a Sharp-Eyed Reader

As a long-standing subscriber who hunts, fishes and jogs along the Delaware and Raritan Canal, I am disappointed to have to say "there is no excuse for the FLIP-FLOP on page 26 of the May/June issue."

Imagine all those LEFT-HANDED SPRINGFIELDS BEING FIRED BY SOUTHPAWS! You should know better!

Paul C. Kayne  
North Brunswick

*Thanx for pointing those long rifles at us. We weren't hoping to change the outcome of the Civil War battle, but we did reverse the photo for page layout purposes. In this issue, we've done it again. The photo of the Burlington City waterfront prior to restoration on page 39 has been "flopped."*

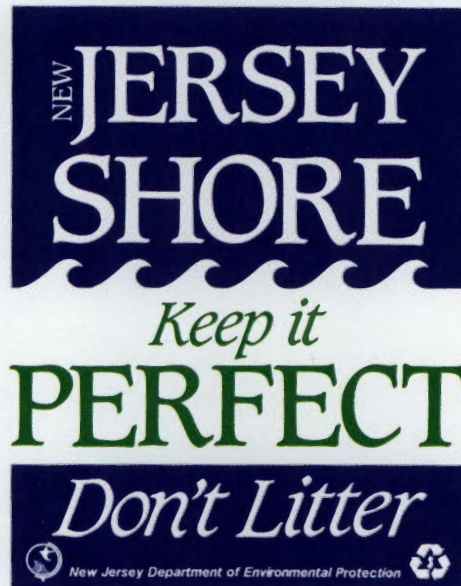
*If we are taking too much liberty with artistic license, let us know.*

## Artificial Reefs Book

Anglers and divers, this is literally right off the press. "A Guide to Fishing and Diving New Jersey's Artificial Reefs" is now available from the DEP Marine Fisheries Administration, Division of Fish, Game and Wildlife.

This 80-page book contains color photos on diving and marine life on the artificial reefs. It includes a pictorial history of the program and reef construction, articles on how to catch reef species and LORAN coordinates for 120 artificial reefs.

To obtain a copy, send a \$13.50 (\$11.95 plus \$1.55 p and h) "Treasurer, State of New Jersey" check to: Guide to Artificial Reefs, DEP Bureau of Marine Fisheries, Nacote Creek Research Station, PO Box 418, Port Republic, NJ 08241.



## Where to Launch Your Boat

The DEP Division of Fish, Game and Wildlife and the Pennsylvania Fish Commission have prepared a map identifying Delaware River boat launch sites.

For a free copy, send a stamped, self-addressed #10 envelope to: Delaware River Boat Access, DEP Division of Fish, Game and Wildlife, 501 East State Street, Trenton, NJ 08625-0400.

## Appies

According to author Nancy Wolff, Appalachian Mountain Club members bike, hike, canoe, climb, ski and complain about the weather.

For information on becoming an Appie, write: New York-New Jersey Chapter, Appalachian Mountain Club, 202 East 39th Street, New York, NY 10016.

## NJO Captures A Gold and A Silver

The 15th Anniversary Issue of *New Jersey Outdoors* was honored recently with two 1989 Neographics Awards. The January/February 1988 cover received a gold award. A silver citation was presented for the interior design and layout.

The DEP publication was among 178 winning firms recognized by the Graphic Arts Association as "the best examples of printing and publishing" from the 68 counties in the Delaware, New Jersey and Pennsylvania tri-state region. More than 2,600 entries were submitted for the 18th annual graphic arts excellence awards.

NJO's selection is a tribute to the dedication and talent of those then associated with your natural resources magazine. Special thanx go to DEP Commissioner Richard T. Dewling, Office of Communications and Public Education Deputy Director Howard J. Wolf and NJO Editor Steve Perrone. Art Director John Mocerri and Graphic Designer Paul Kraml continue the award-winning design.

## Missing

Biographical information for the authors of "Swartswood State Park Celebrates Seventy-Five Years" was left out of our last issue. Rutgers University graduate **Marianne Ofenloch** has been with the Division of Parks and Forestry for two years. The Swartswood article was her first NJO contribution.

Another newcomer to our readers, **Karla Risdon** has been a park interpretive specialist for two seasons and is now completing her masters in environmental studies at Montclair University. We sincerely regret the omission and hope to see your by-lines again.

# Setting Sail . . .

Photos courtesy of Schooner Clyde A. Phillips, Inc.



*Removing a pilot tower and replacing the missing second mast will restore the Clyde A. Phillips to its pictured 1932 sailing status.*

*(facing page) The schooner was used for oystering and then clamming in the 1950s.*



By Larry Sarner

The Hudson River has its sloop Clearwater. The Delaware Bay and its river will soon have their own schooner, the Clyde A. Phillips, with our support.

Many of us are familiar with the efforts of the Clearwater to promote environmental and historical awareness along the Hudson. Conceived over 20 years ago by Pete Seegar and others, the sloop and its active organization have worked hard to restore the Hudson. No doubt they have played a role in its continuing recovery to a healthier and livelier waterway.

There now exists an organization, a boat and a dream to chart a parallel course through Delaware Bay and its river. Three people are at the heart of this effort. They have successfully gathered people into an organization which has ambitious goals and a long, tough voyage to success ahead. And now they have a boat.

Since its completion in 1928, the Clyde A. Phillips sailed as an oyster dredge boat, was motorized for use as a Delaware River fireboat, and was a surf clammer when John Gandy found it. The former naval officer now sailing as a merchant marine officer bought the schooner and brought it home. Megan Wren, president of the schooner project, studied marine biology and environmental science at Stockton State College. She sailed and worked aboard square riggers, brigantines in the Caribbean and the Spirit of Massachusetts, a replica of a Gloucester fishing schooner. Wildlife biologist and artist Greg Honachefsky is a DEP Division of Fish, Game and Wildlife conservation officer and secretary/treasurer of the organization.

Their goal is to restore the Delaware Bay schooner to its original two-masted, gaff-rigged condition, compromising authenticity only to meet

A marine education specialist in the Division of Fish, Game and Wildlife, **Larry Sarner** has authored several Wildlife in New Jersey profiles and NJO articles. He is participating in the schooner project.

## for Clean Water and Environmental Education



U.S. Coast Guard regulations. The schooner will be a floating school for teaching children and students of all ages about the maritime history of the Delaware Bay, its shipbuilding and oystering industries, and the interaction between the water and the crabbers, oystermen, trappers and fishermen.

Through "hands-on" programs, students and passengers on the vessel will learn about marine ecosystems, especially those in the Delaware Bay watershed. The founders envision the schooner and its organization working on marine biology, oceanography and related sciences in cooperation with educational institutions or research groups.

As a forum and focal point for citizens with varied environmental interests, the Clyde A. Phillips project will integrate music, history, folklore, art and other disciplines into the environmental awareness teaching. A per-

iodical to record water resource facts and issues of the Delaware Bay and New Jersey will be published.

The 85-foot schooner and her 22-foot beam were built locally at the Dorchester shipyard in Maurice (say "Morris," the local pronunciation, when in the area) River Township. Having survived winter at its port on the river, this symbol of the regional heritage and what was once the economic foundation of the bayshore communities is in the process of being restored.


Getting it under sail will require substantial monetary donations and lots of muscle. If you get to the Mauricetown (remember, that's "Morris" town) area, volunteers are needed and welcomed at work sessions on good-weather weekends. With a cooperative effort and the strong local support already received, the boat and

its on-board programs should be underway in about two years.

The Clyde A. Phillips and the New Jersey Aquarium in Camden, scheduled to open shortly after the schooner sails, tell the story of man's impact on and relationship with the water. As educational projects, they will make us more aware of the fragile nature and value of this interaction and about water quality problems and solutions.

The Schooner Clyde A. Phillips, Inc., a non-profit organization, needs public support. For information on the project, membership in the organization or in aiding the restoration effort, contact:

Schooner Clyde A. Phillips, Inc.  
PO Box 57  
Dorchester, NJ 08316  
609/453-1259

Your involvement and support in the project will make a difference. 

# Burlington City

## A Riverfront Walk from Past to Present

By Robert E. Birdsall

When the residents of Burlington undertook a major restoration project to recapture the city's colonial heritage, it is not surprising that they did so while providing increased recreational opportunities. Founded more than three centuries ago, the city was a busy Delaware River port, and the cornerstone of the restoration again centered around its waterfront.

Burlington received a \$445,000 grant in 1980 from the DEP Green Acres Program for shore stabilization and the construction of a riverfront promenade and boat ramp. A 1984 Green Trust loan and grant for acquisition of riverfront acreage totaled \$75,000. Recently completed, the restored waterfront area is now the site of a shrub-lined promenade and an agenda of activities, such as summer band concerts and a fall regatta. In addition, it provides a gateway to a history-filled walking tour of this "capital of West Jersey" settled in 1677.

Many locals still remember another popular riverfront recreational activity from the not too distant past. Only 200 yards offshore, Burlington Island was once the site of a major amusement park. Opened in 1917, the park drew people from Trenton and Philadelphia who came to Burlington by train or steamboat. They then paid a nickel to take the ferry, the William E. Doron, to the 400-acre island. As many as 4,000 people a weekend visited Island Beach, as it was then known, to dance or ride the large roller coaster, swings and carousel. The merry-go-round is now on the boardwalk at Seaside Heights.

A 1928 fire, which started at 2 a.m., nearly destroyed the amusement park. By the time fire equipment could be ferried across the river from Bristol, Pennsylvania, the rides and roller coaster were virtually destroyed. Six years later another fire completed the job.

The city no longer uses Burlington Island Lake or eight wells on the island for its drinking water supply. Today Burlington Island is deserted, and developers are wooing the city with plans for development. However, according to Mayor Herman T. Costello, "any development would have to include recreational facilities on the island for the people of Burlington."

The 1988 summer concert series held on the riverfront promenade offered nine programs, ranging from a "Tribute to Irving Berlin" to country and western. Up to 2,000 people attend these concerts, and there is no charge (but bring your own blankets and chairs). The Burlington City Department of Recreation (609/386-4070) can provide information on the 1989 schedule.

In fall the waterfront comes alive with the



Robert E. Birdsall

colors of college sculling crews and other boat clubs as they compete in the Oneida Regatta. Held the first Saturday of October, the regatta attracts up to 250 rowers for the three and-a-half mile race around Burlington Island.

The course is laid out to provide riverfront spectators a front row seat for the event. The regatta is sponsored by the Burlington Oneida Boat Club, originally founded in 1873. The club rowed competitively until World War I intervened but did not race again until 1977. The October regatta is sanctioned by the United States Racing Association, and its popularity increases each year.

A visit to Burlington would not be complete without taking the historical walking tour of the city. Stops include visits to the homes of James Fennimore Cooper, author of *Last of the Mohicans*, and Captain James Lawrence, the 1812 naval war hero who, though mortally wounded, shouted to his men, "Don't give up the ship!"

The "Grey Hound," the large wooden roller coaster on Burlington Island, thrilled thousands each weekend.

(facing page, top) You could ride the William E. Doron from Burlington City to the amusement park for five cents.

(fp, center) Leaving Island Beach, as Burlington Island was then called, the homeward bound crowd waits to board the ferry.

(fp, right) The Burlington waterfront before restoration.

(fp, bottom) The promenade provides public access for fishing, viewing the Oneida Regatta, and watching ore boats pass under the Burlington-Bristol bridge enroute to a steel mill uptver.

Robert E. Birdsall



Last summer **Robert E. Birdsall** entertained us from the other shore with "Brigantine Revisited." An avid angler, hunter and past president of the Shrewsbury Retriever Club, Bob is also an AT&T district manager.

City of Burlington

Robert E. Birdsall



Other historical buildings include the Ulysses S. Grant House, where the Grant family lived during the Civil War, and the Revel House which dates back to 1685. The Library Company of Burlington was chartered by King George II in 1758 and is the oldest, continuously operating library in the state.

Burlington successfully has become a modern riverfront community without losing sight of its colonial heritage. Gone are the "Billy Doron" and the rides and dances of Burlington Island. What remains is a city where residents and visitors enjoy riverfront concerts, colorful regattas and a walk through history.

For additional information on Burlington City or the walking tours, contact:

Dr. Nicholas P. Kamaras  
City Hall  
432 High Street  
Burlington, NJ 08016  
609/386-3993



City of Burlington

# Horseshoe Crab

By David Chanda

The horseshoe crab has remained virtually unchanged for 400 million years. No other living animal resembles the prehistoric-looking creature. A member of the arthropod family, this marine crustacean has a very recognizable external skeletal framework (exoskeleton), rather than an internal one like humans and vertebrates.

Known also as the king crab, the horseshoe crab is actually not a crab. This living fossil, more closely related to the common garden spider than to a blue crab, lives on the mud or sandy bottoms of bays, estuaries and Atlantic coastal areas from Maine to the Gulf of Mexico. None are found on the West Coast. *Limulus* feeds on a variety of clams, worms and other invertebrates.

Although frightening in appearance, this innocuous creature is seen annually by millions of visitors to New Jersey coastal areas. Its long, pointed tail looks menacing but is really quite harmless. Used as a lever, the tail is pushed into the sand to right the crab when it is turned upside down by wave action. A horseshoe crab, unable to turn itself over in this fashion, likely will die on the beach before the next high tide from the hot drying sun.

Beginning more than a hundred years ago and continuing until the middle of this century, horseshoe crabs were harvested commercially from Cape May County beaches. Collected by the millions and allowed to dry in the sun, they were ground up for use as fertilizer and as a poultry food supplement. More recently, horseshoe crab blood and a coagulating agent in it have been used in medical and pharmaceutical research.

Female crabs reach about 24 inches in length, the male slightly smaller. In

order to grow the horseshoe crab must molt, shedding the old shell and forming a new larger shell. *Limulus* increases in size by about one-fourth with each successive molt.

A horseshoe crab's body varies in color from olive-brown to a much darker reddish-brown and consists of three parts. The cephalothorax or carapace is the larger portion of the body. Shaped like a horseshoe, this hard, leathery shell protects the digestive, circulatory and respiratory organs. The second part, the abdomen, is the hindmost body division. The long, spikelike tail is the final section.

Looking at the horseshoe crab's underside reveals one pair of pincers in front of the mouth, surrounded by five pairs of walking legs. Each leg has a burr-like base which helps grind up food. On the underside of the abdomen are the breathing organs, pairs of broad, leaf-like structures called book gills.


Migrating from deeper water to the beach, horseshoe crabs mate in spring. During higher lunar tides, the female emerges on the sand above the low tide mark. In a shallow pit near the high water line she lays from 200 to 300 pale green eggs about the size of the head of a pin. Using his heavy specialized walking legs, the male attaches to the female's abdomen and releases sperm as she deposits the eggs. Gentle wave action brings the sperm in contact with the eggs for fertilization and covers them with a protective layer of sand.

The eggs remain buried for four to six weeks until hatching, when the larvae are returned to the bay with the next tide that reaches them. In the larval stage they remain near the shore,

moving gradually into deeper water as they grow. Molting periodically, the horseshoe crab reaches full size and sexual maturity in about 10 years.

For millions of years, horseshoe crabs by the hundreds of thousands have gathered on the Delaware Bay shoreline to spawn. Their reproductive activities coincide with another natural phenomenon of international significance—the arrival of more than a million shorebirds that feed on the protein-rich eggs. The most abundant of these exhausted and hungry travelers on our cape beaches are red knots, ruddy turnstones, sanderlings and semipalmated sandpipers.

The Delaware Bay area embraces the second largest shorebird staging area in North America. Approximately 80 percent of the Western Hemisphere's red knot and ruddy turnstone populations stop there on a 6,000-mile migration from their wintering areas in South America to Arctic tundra breeding grounds. On the Delaware Bayshore, they rest and gather the nourishment necessary to complete the final leg of their long journey.

For thousands of years the horseshoe crab has illustrated the important role each species plays in the ecosystem. Without the crab's Delaware Bay reproductive rite, millions of shorebirds might not survive their annual Arctic migration to breed. The survival of these migrant shorebirds is contingent upon protection of tidal coastal waters and beaches from development and the devastating effect of water pollution. The next time you visit the Jersey Shore and see a horseshoe crab, it should be with a greater appreciation of this crustacean and the need for the continued biodiversity of species. 



New Jersey State Library

Carol Decker  
© '89

