



THE WEALTH
& WORTH OF
DELAWARE
WETLANDS

So ... what's the big deal about wetlands?



Photo courtesy of Bob Meadows, Delaware Division of Fish & Wildlife

The big deal is ...
that wetlands are ...



a key element of DE's natural heritage
and vital to the economy of the region

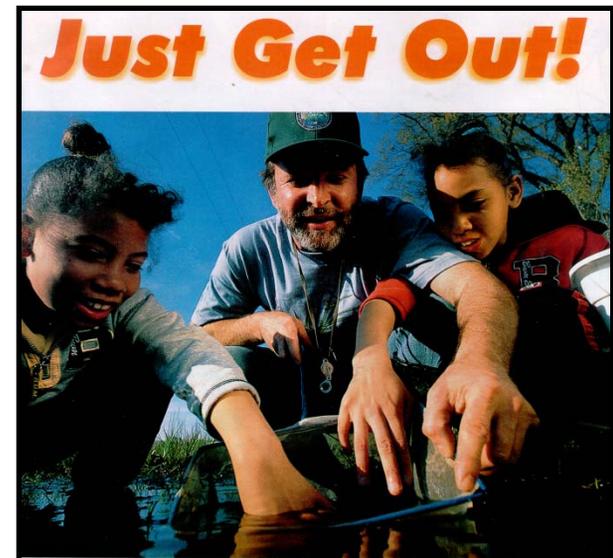


"Wetlands are powerful places in which to learn."

great resources for teaching and learning



prominent features of DE's
landscape and watersheds



fun places for exploring!



So ... what are wetlands anyway?

WETLANDS are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

Federal Register, EPA, 1982

For a more operational definition, try this ...



"Wetlands are lands that are periodically flooded or saturated with water near the surface for periods long enough to affect plant growth and soil development ..."

"the minimum wetness ... is saturation within 1 foot of the ground surface for 2 weeks or more of the growing season in most years."

Tiner, 2001



So ... now that we know what wetlands are ...
what kinds of wetlands do we have in DE?

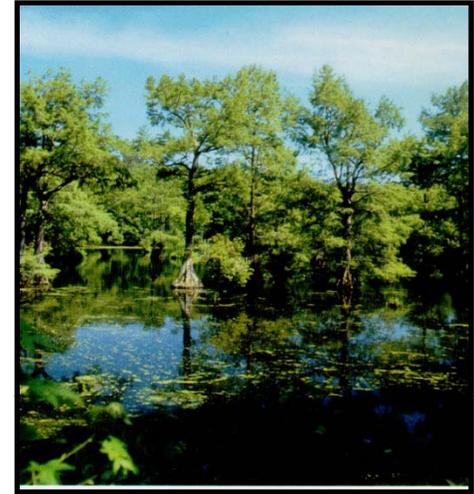
Some key Delaware wetland types



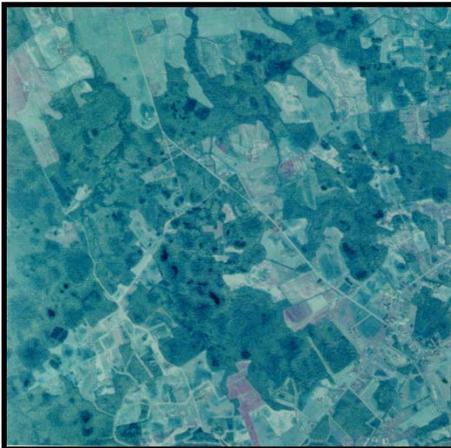
Tidal marshes



Hardwood swamps



Cypress swamps



Delmarva Bays are a special kind of seasonal wetland found on the coastal plain. They appear as small, shallow pools, surrounded by woods. In winter/spring they're wet. In summer they dry up.



So ... we have all these wetlands,
but what good are they anyway?



The answer is ... They are good in lots of ways ...



provide critical habitat for many of our rarest and threatened species

serve as refuges for recreating & reconnecting with the natural world



"When I would recreate myself, I seek the darkest wood, the thickest and most interminable and most dismal swamp. I enter the swamp as a sacred place - a sanctum sanctorum. This is the strength, the marrow of nature."

Henry David Thoreau



buffer land areas from the full effects of storms and floods



improve water quality by trapping, filtering and removing pollutants



offer valuable nursery and growing areas for fish and shellfish

For those of
you who like
that old
bottom line ...



\$22,100,000,000
estimated direct value
of all U.S. wetlands to
fishing/hunting/trapping



\$2,600,000,000
value to wildlife watching
& eco-tourism activities



\$11,700,000,000
value to flood control
& shoreline protection



\$1,600,000,000
value to filtering and
improving water quality

Grand Total: \$38 billion

Source: Valuing wetlands: the cost of destroying America's wetlands. 1994. National Audubon Society. Washington, DC. 32 pages.

ROLE OF WETLANDS IN OUR WATERSHEDS



Wetlands are often transitional places between deepwater habitats and the upland areas where we live, play, shop, etc. As such, they help buffer us from the damaging impacts of storms and floods.



Wetlands also hold water in times of drought. This helps recharge our drinking water aquifers.

Because wetlands are very good at uptaking, trapping and removing pollutants, they help clean water coming off the land before it runs off to our rivers and bays.



Wetland plants hold soils together, reducing and preventing erosion and the problems it causes.

Hard lessons from recent "natural disasters"

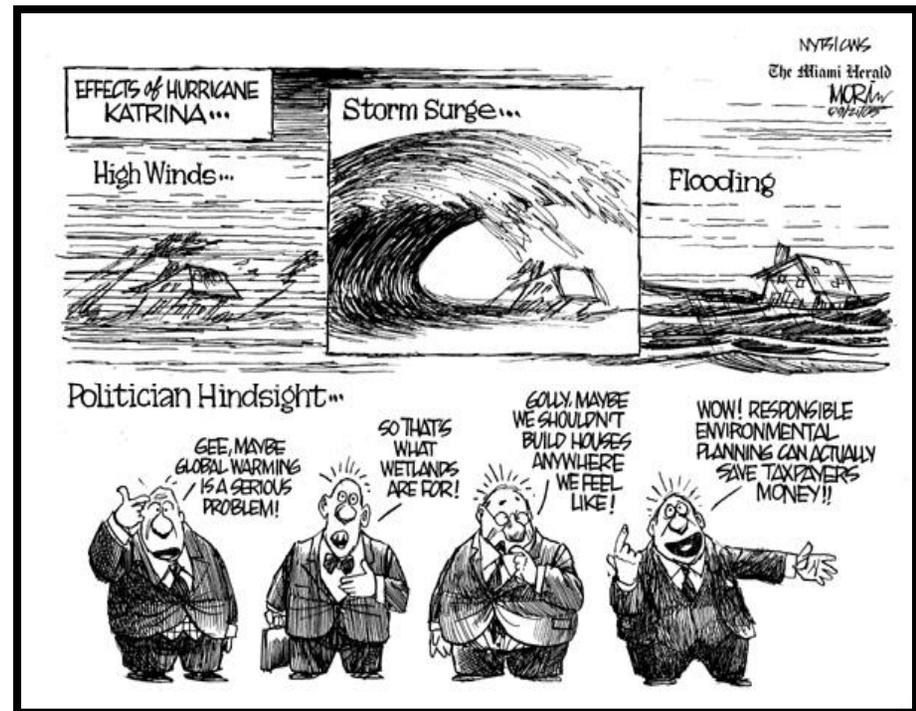
Wetlands provide the primary line of defense against storms and floods.

Satellite images from the 2004 Asian tsunami showed that coastal areas where mangrove swamps were still present (not lost to human development) suffered far less damage than places where wetlands had been removed.

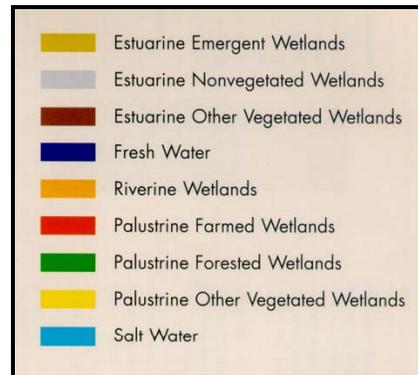
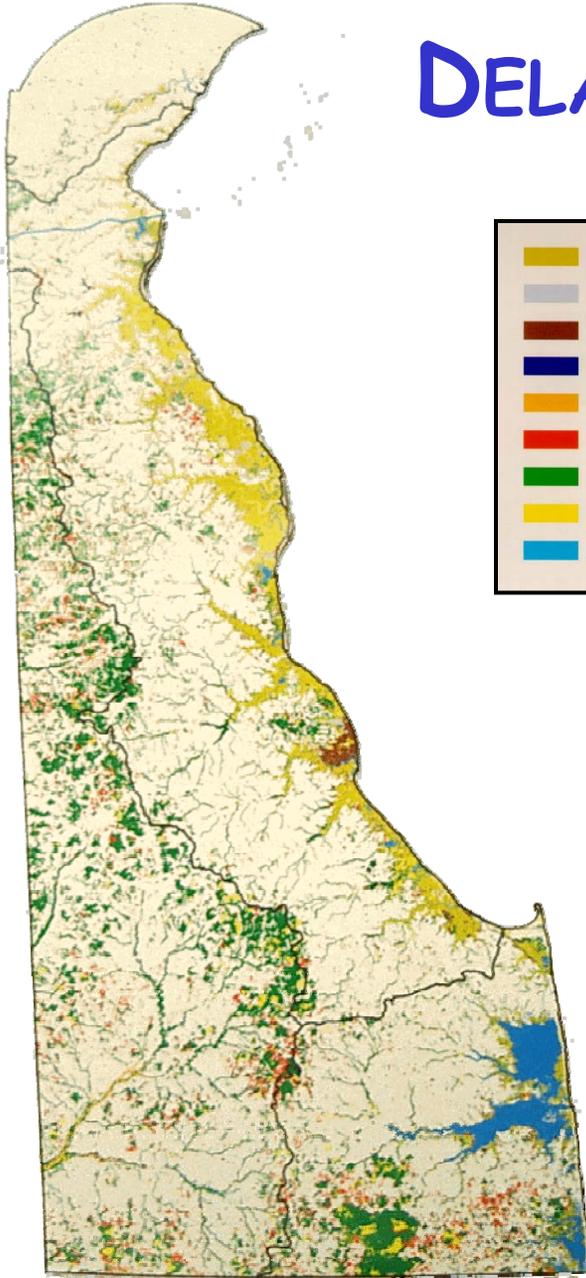
The same lessons apply to Hurricane Katrina and the Gulf Coast in 2005.

Since 1930, 1900 square miles of Louisiana's coastal wetlands have been lost (about the size of DE). For every 2.7 miles of coastal wetlands present, storm surges reduce by as much as one foot!

Although protection is a higher priority today, >25 square miles of Louisiana's valuable coastal wetlands are still lost each year (roughly two acres every hour).



DELAWARE WETLANDS TODAY



30% of Delaware's
land area today
(>350,000 acres) is
classified as wetland

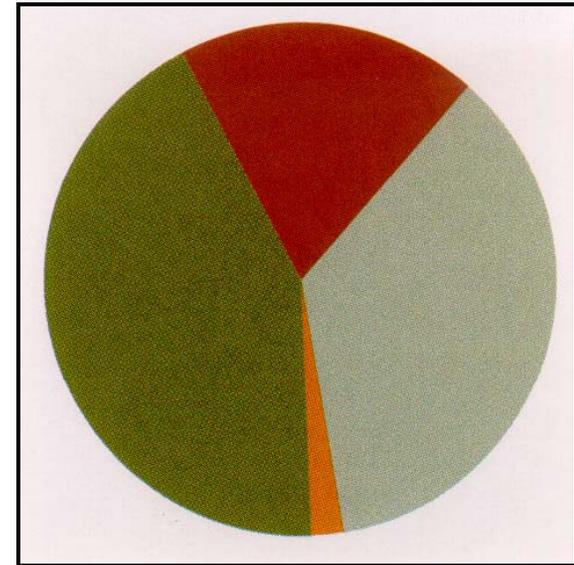
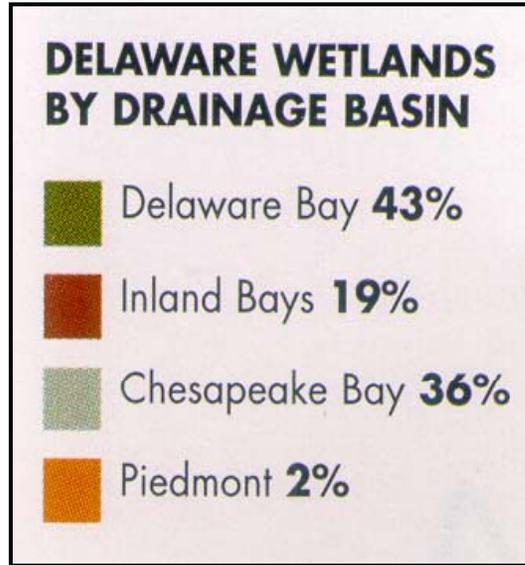
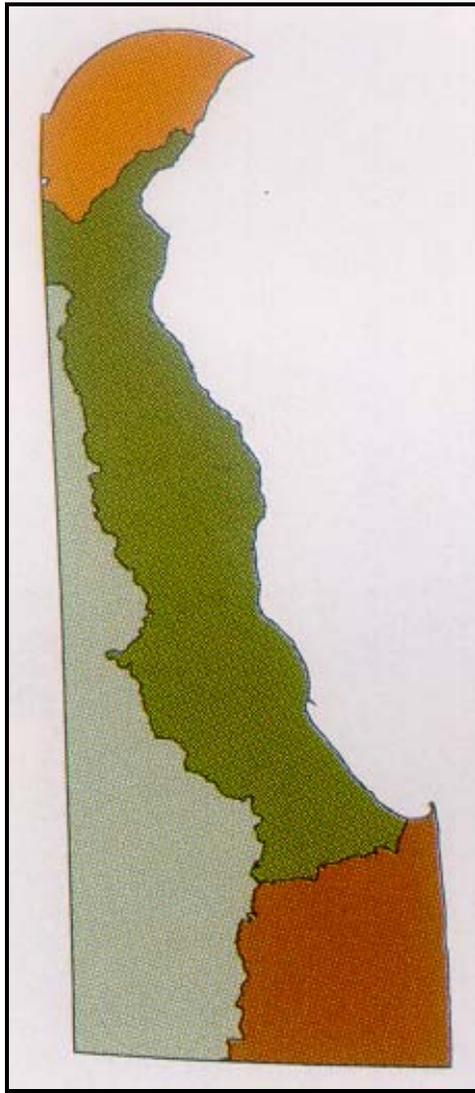
The two bands (coastal yellow and inland green) represent the two predominate wetland types in DE:

Estuarine (tidal) marshes

Freshwater forested wetlands

Source: Tiner, R.W. 2001. Delaware Wetlands: Status and Recent Trends. U.S. Fish & Wildlife Service. 19 pp.

DE WETLANDS BY WATERSHEDS



Aside from the northern *Piedmont* part of the state, wetlands form a substantial share of all DE watersheds. *Can you guess why this is so?*

The Piedmont - being hillier, less low-lying and more developed - offers fewer places where water can collect at or near the ground level.

So ... if wetlands are so valuable, how well are we doing in conserving and protecting them?



Over the last several decades, rate of wetland loss in Delaware has declined dramatically. Although some of these losses are offset by wetland creation and restoration projects, we're still losing some wetlands every year.



Those losses are mainly impacting the smaller, more inland freshwater wetlands, not the larger, better-protected expanses of coastal marshes.



COASTAL Wetlands: **Protected!**
(averaging <11 acres lost/year)



FRESHWATER Wetlands: **Need help!**
(averaging >200 acres lost/year)

So ... what should
we be watching
out for?

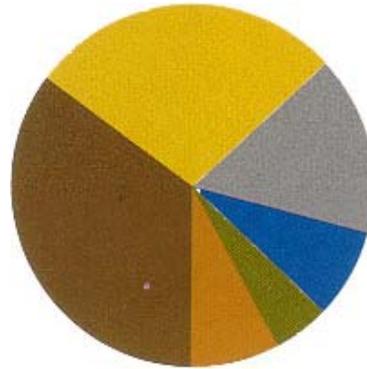


Photo courtesy of Bob Meadows, Delaware Division of Fish & Wildlife

residential development - the urbanization of the coastal plain



THREATS TO DELAWARE WETLANDS TODAY



- Residential Development
- Agriculture
- Highway and Road Construction
- Pond Construction
- Industrial/Commercial Development
- Other

Causes of wetland loss on DE's coastal plain (source: Tiner, 2001)

habitat loss/fragmentation



loss of protection for small, seasonal, isolated wetlands



maintaining and restoring the quality of wetlands remaining



So, what can we do to help?





What people like
YOU can DO
to help preserve
DE wetlands



Contact your state or federal representatives in support of legislation that protects our wetlands, watersheds and wildlife resources.

Support organizations - like *Ducks Unlimited*, *The Nature Conservancy* and the *National Audubon Society* - involved in wetland conservation.

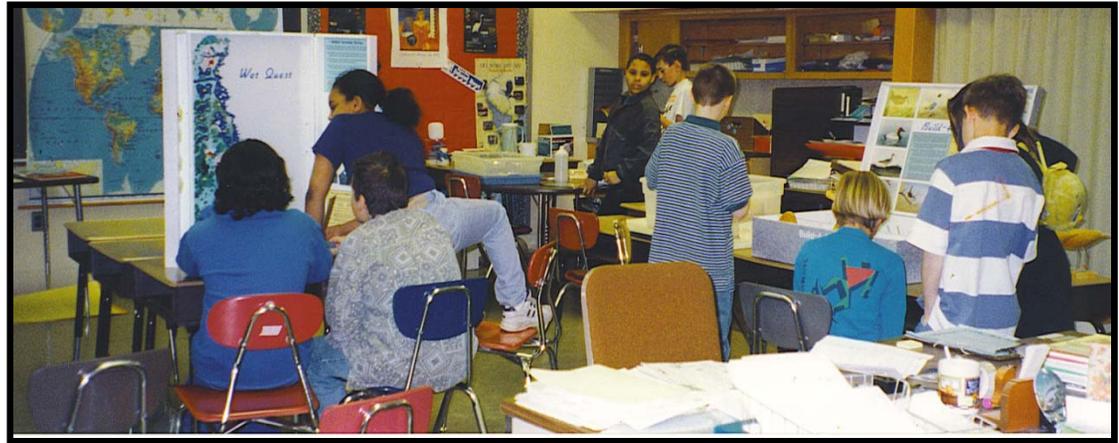
If you have wetlands on your property, schoolgrounds or community, get involved in projects that help restore or enhance those habitats.

Learn all that you can about the wonders and workings of wetlands and teach others to appreciate their many benefits and values..

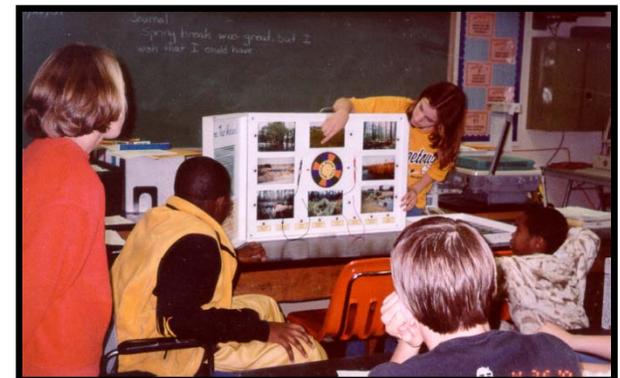


And if you really want to get hands-on ...
we have some resources that can help

WETLAND ACTIVITIES FOR DELAWARE EDUCATORS



innovative set of 8 interactive learning stations
designed with H.S. students' help for gr. 4-8
workshop attendance required for kit loan/use
guidebook w/DE-standards-correlated lessons



And if you want to get involved in real on-the-ground stewardship, check out



Adopt-a-Wetland is a community-based environmental stewardship program developed to heighten public awareness of the many functions and intrinsic value of wetlands to humans and the natural world.

AAW engages school groups, youth groups, businesses, organizations and even families, in adopting wetland areas near them, and serving as volunteer stewards of those resources for future generations.

WHAT ADOPT-A-WETLAND OFFERS



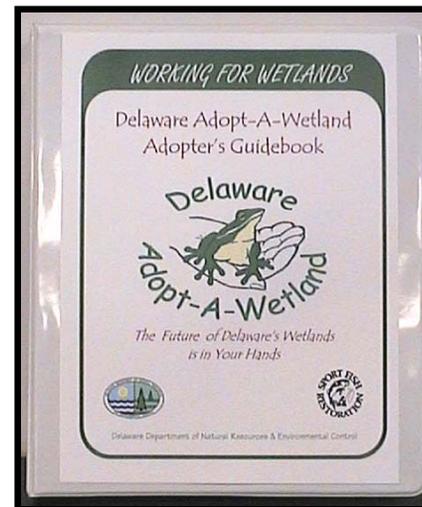
Sign for adopted site



Video programs



Workshops & other hands-on trainings

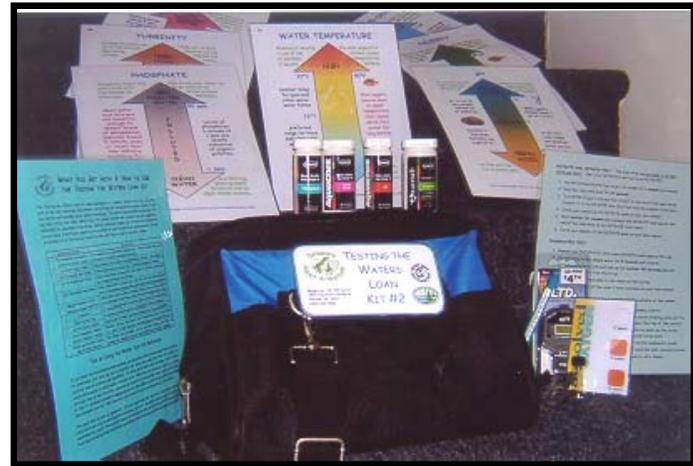
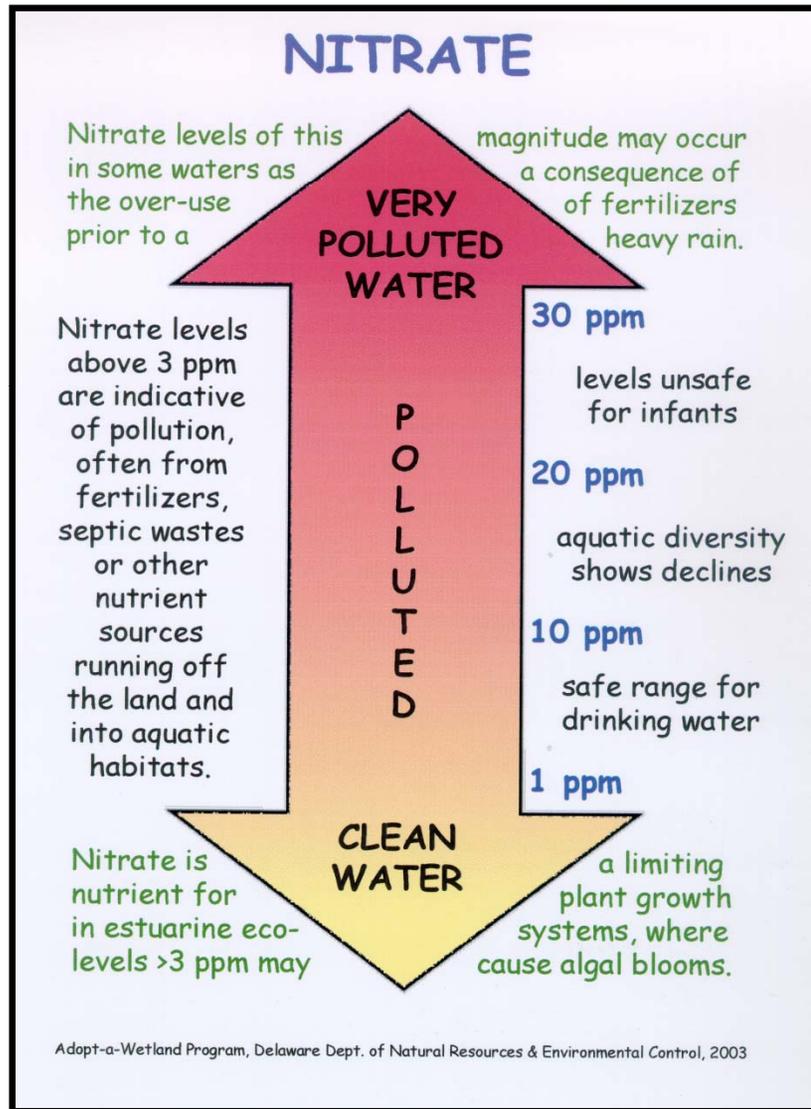


Adopter's Guidebook



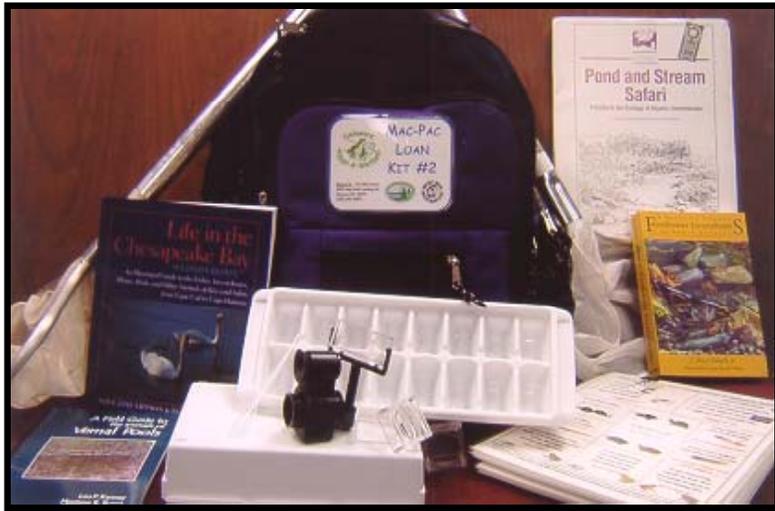
Loan kits for wetland monitoring projects

Testing the Waters kit



utilizes fast and easy-to-use test strips and tabs to provide a rough assessment of key water quality conditions in the wetland

provides testing & informational materials useful for assessing: pH, salinity, dissolved oxygen, nitrates, phosphates & turbidity



this compact backpack-based kit features a variety of materials for exploring the fascinating world of aquatic invertebrates; includes dip nets, sorting trays, mini-microscopes, field guides and a specially-created set of critter identification cards

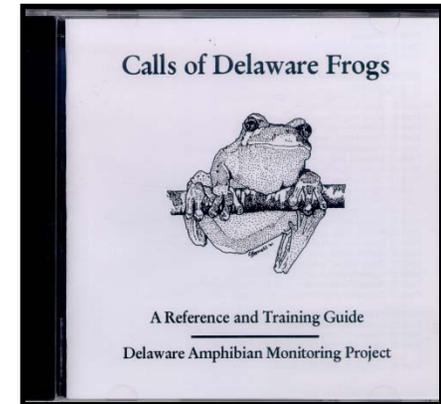
Mac-Pac Kit

PAGE 3		WATER BEETLE ADULTS	
<p>CRAWLING WATER BEETLES</p> <p>head more distinct from body</p>  <p>These beetles are small (<math><1/4''</math> long) compared to others shown here.</p> <p>They are usually brown or yellow with black spots; rows of tiny holes on wings give them a striated look.</p> <p>Notice also how the head on this macro extends out from its body.</p> <p>They are usually found around aquatic vegetation, often in or on clumps of filamentous algae.</p>	<p>WHIRLIGIG BEETLES</p> <p>front legs longer than rear legs</p>  <p>This shiny black beetle swims fast in "schools" on the water surface. It has unique, 2-part eyes for seeing above and below the water surface.</p>  <p>The front legs are well-developed, but mid/hind legs are shorter and flattened like paddles for rowing.</p>		
<p>WATER SCAVENGER BEETLES</p> <p>antennae enlarged at end</p>  <p>These beetles are shiny-black & deeper-bodied than their more flattened diving beetle cousins.</p> <p>Unlike other beetles shown, its antennae are clubbed at the end.</p> <p>It's a less-smooth swimmer, with its hind legs beating alternately.</p> <p>When scavenger beetles surface for air, they do so head first.</p>	<p>PREDACEOUS DIVING BEETLES</p> <p>antennae slender</p>  <p>This macro can be large or small, black, brown or a mix of both.</p> <p>Unlike the water scavenger, its antennae are thin throughout.</p> <p>It is a smooth swimmer, stroking its hind legs in unison as it goes.</p> <p>When diving beetles surface for air, they do so tail up/head down.</p>		
<p>RIFFLE BEETLES</p> <p>long antennae</p>  <p>As the name suggests, these small beetles prefer the swifter, rocky waters of streams & lake shores.</p> <p>The hardened outer wings feature vertical rows of fine indentations giving them a pock-marked look.</p> <p>The shape is more cylindrical than oval; both antennae and legs are longish for its size, with each leg ending in two prominent claws.</p>	<p>LONG-TOED WATER BEETLES</p> <p>small head</p>  <p>Due to their small size (<math><1\text{ cm}</math>), these beetles are not as often observed as others shown here.</p> <p>The head is barely visible, it being withdrawn into the thorax.</p> <p>Hind legs lack the hairy fringes typical of diving/scavenger types.</p> <p>In magnification, the base of the antennae look like teeth in a comb.</p>		

Developed by: Delaware Adopt-a-Wetland Program (Delaware Department of Natural Resources & Environmental Control, 2003)
 Illustrations from: *A Guide to Common Freshwater Invertebrates of North America* (Voithell, 2002) & *Aquatic Entomology* (McCafferty, 1981) M-17



Helping with Herps kit



provides an assortment of materials for familiarizing adopters with the amphibian and reptile components of the wetland fauna

Page 8 **Tree Frogs and Chorus Frogs**

<p>Northern Spring Peeper (<i>Pseudacris c. crucifer</i>)</p> <p>X-marking on back</p>  <p>Call: Peep Peep Peep When: late February through July</p> <p>The Spring Peeper is found statewide in and around a variety of wetland habitats. They are easily identified by the X-marking on its back. The skin is smoother than the cricket frog.</p>	<p>Eastern Cricket Frog (<i>Acris c. crepitans</i>)</p> <p>triangle between eyes</p>  <p>Call: two stones being struck together When: May and June</p> <p>The Cricket Frog occurs statewide on the Coastal Plain in temporary pools, ponds and slow-moving streams. It is identified by its small size (<1.5"), rough, warty skin, short hind legs, and the black triangle marking between its eyes.</p>
<p>Cope's Gray Treefrog (<i>Hyla chrysoscelis</i>), and Gray Treefrog (<i>Hyla versicolor</i>)</p>  <p>white spot</p> <p>Call (Gray): slow trill Call (Cope's): quicker higher pitch trill When: May to July</p> <p>Gray Treefrogs are larger (1.3-2") and stouter than the peeper, cricket and chorus frogs. The skin is rough and warty and usually gray to green in color. There is a white spot beneath each eye, and the back side of the hind legs is bright orange to yellow.</p>	<p>New Jersey Chorus Frog (<i>Pseudacris feriarum kalmi</i>)</p>  <p>stripes</p> <p>Call: fingernails across teeth of a comb When: Feb. to May</p> <p>About the same size as Spring Peepers, the New Jersey Chorus Frog is longer-legged, smoother-skinned and has three dark stripes running down its back and side. There is also a light line on the upper lip.</p>
<p>Barking Treefrog (<i>Hyla gratiosa</i>)</p> <p>many dark round spots</p>  <p>Call: like barking dog When: late April through July</p> <p>An endangered species in DE, the Barking Treefrog is easily identified by its large size (2-2.5"), rough skin, spotted pattern, and distinctive call. Females have a white throat, and males a greenish throat.</p>	<p>Green Treefrog (<i>Hyla cinerea</i>)</p> <p>may have white stripe</p>  <p>Call: single note at 1-sec. intervals When: May to July</p> <p>The Green Treefrog is a medium-sized (1.3-2.3"), smooth-skinned, bright green species. Color and pattern variations can be considerable (see above). Often there is a whitish stripe down the side.</p>

Developed by: Delaware Adopt-a-Wetland Program (DE Department of Natural Resource and Environmental Control, 2003)
Illustrations from: *A Field Guide to Reptiles & Amphibians of Eastern and Central North America* (Conant & Collins, 1998) **H-33**

emphasizes opportunities to get involved in projects aimed at monitoring frog populations, including a frog call CD and protocol from the DE Non-Game Program

So, a few last closing thoughts ...





*"A different world
cannot be built by
indifferent people."*

*"What can I do???
I am only one.
But I am one.
I cannot do everything,
But I can do something."*

Anonymous





There is hope . . . and it is us!

The following individuals/agencies contributed photos used in this slide show:

Todd Fritchman, Indian River School District

Bob Meadows, DE Division of Fish and Wildlife, Mosquito Control Section

Amy Jacobs, DE Division of Water Resources, Watershed Monitoring Section

Mark Biddle, DE Division of Water Resources, Watershed Monitoring Section

Steve Williams, DNREC Secretary's Office, Ecological Restoration Program

Delaware DNREC, Natural Heritage and Endangered Species Program

DE-DNREC, Aquatic Resources Ed. Center and Adopt-a-Wetland Program

Photos and data relating to DE wetlands types/status were also taken from:

Tiner, R.W. 2001. *Delaware's Wetlands: Status and Recent Trends*.
U.S. Fish and Wildlife Service, Northeast Region, Hadley, MA.